

FIG. 1

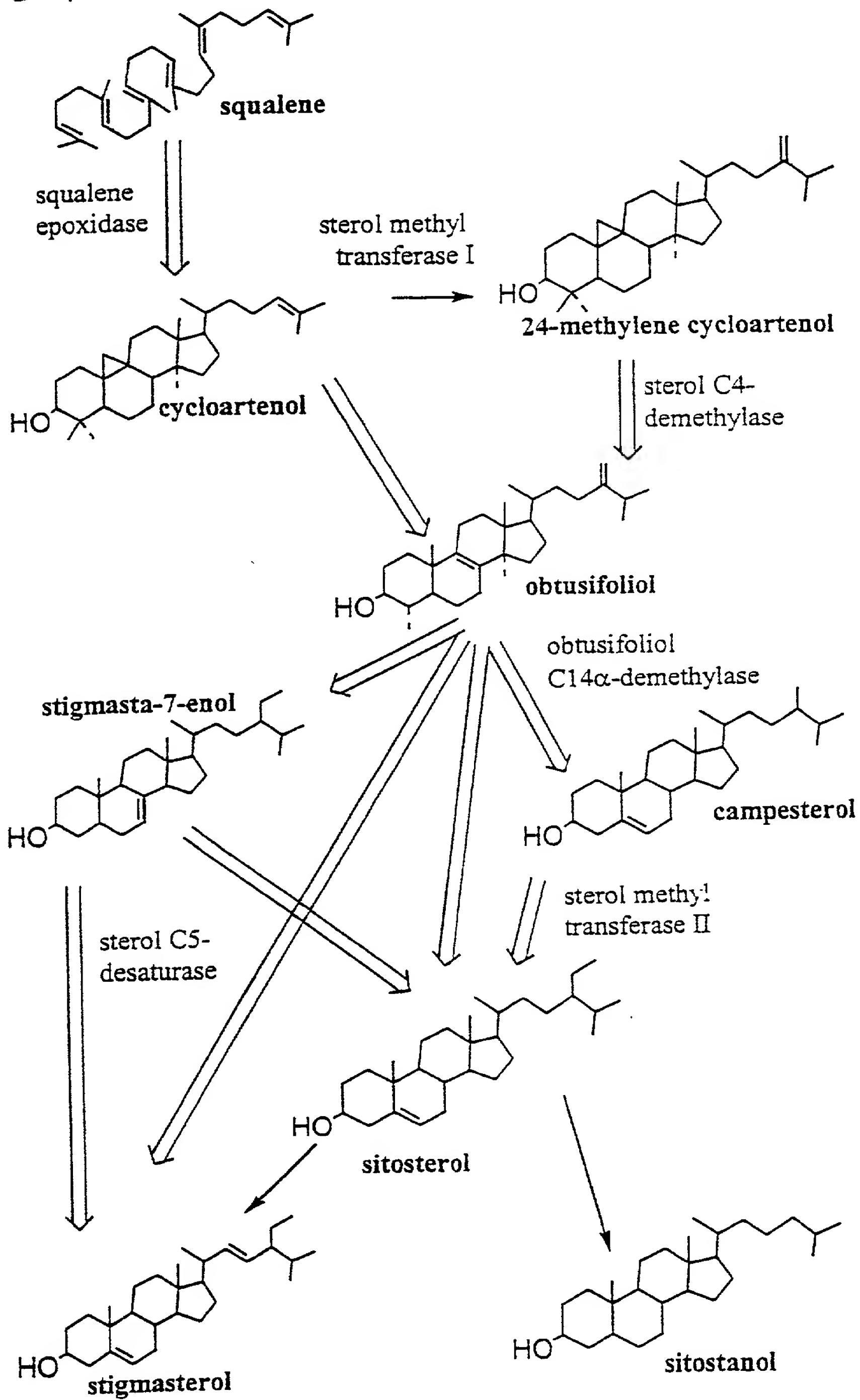
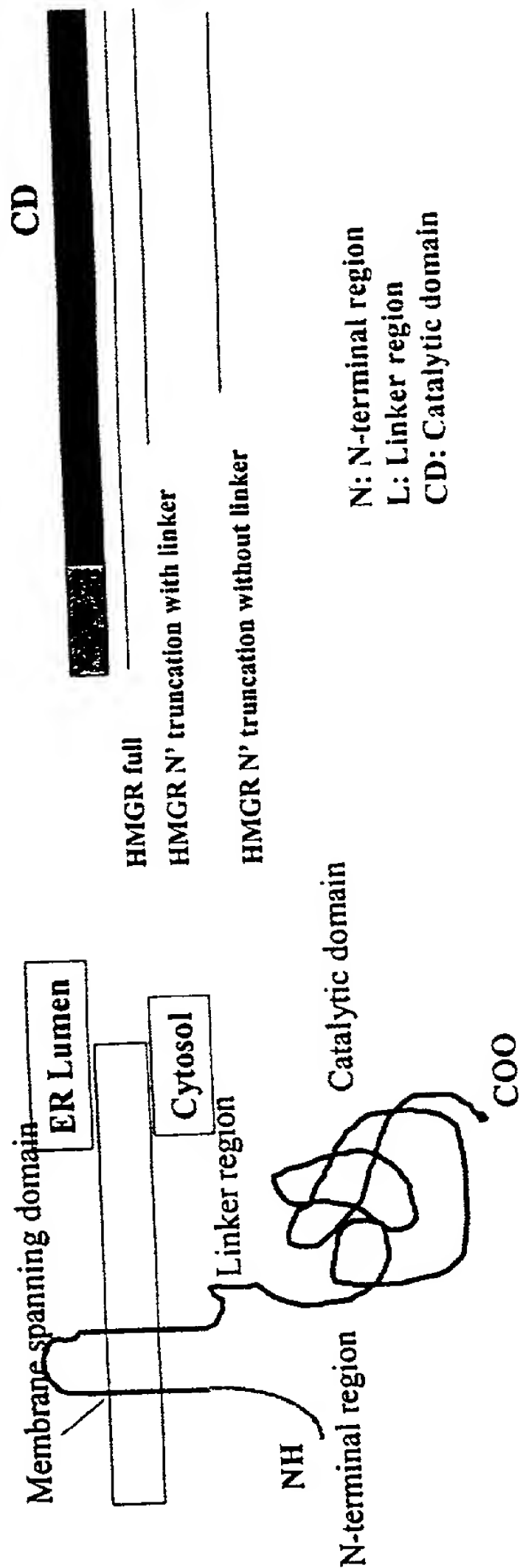


FIG. 2



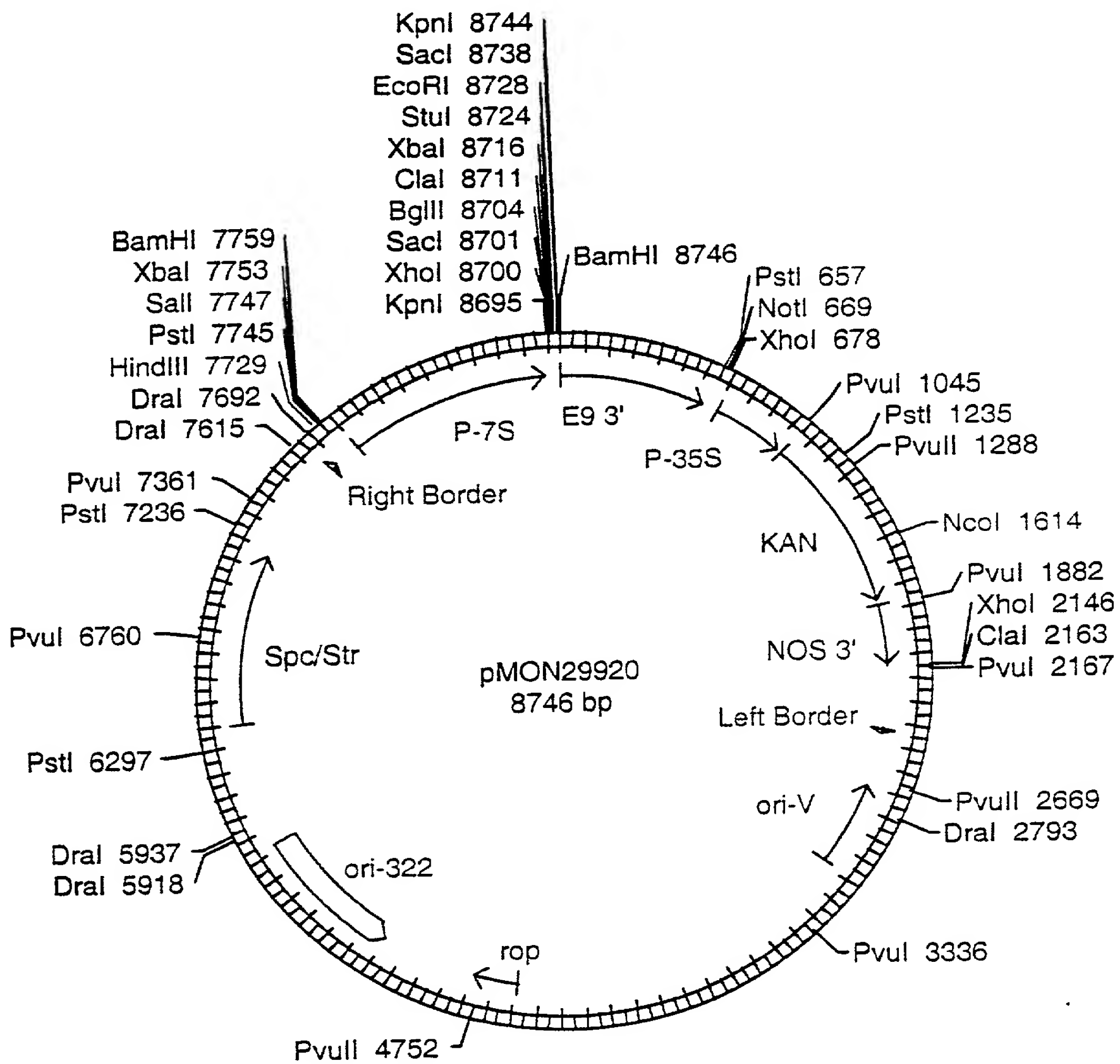


Figure 3: Construct pMON29920

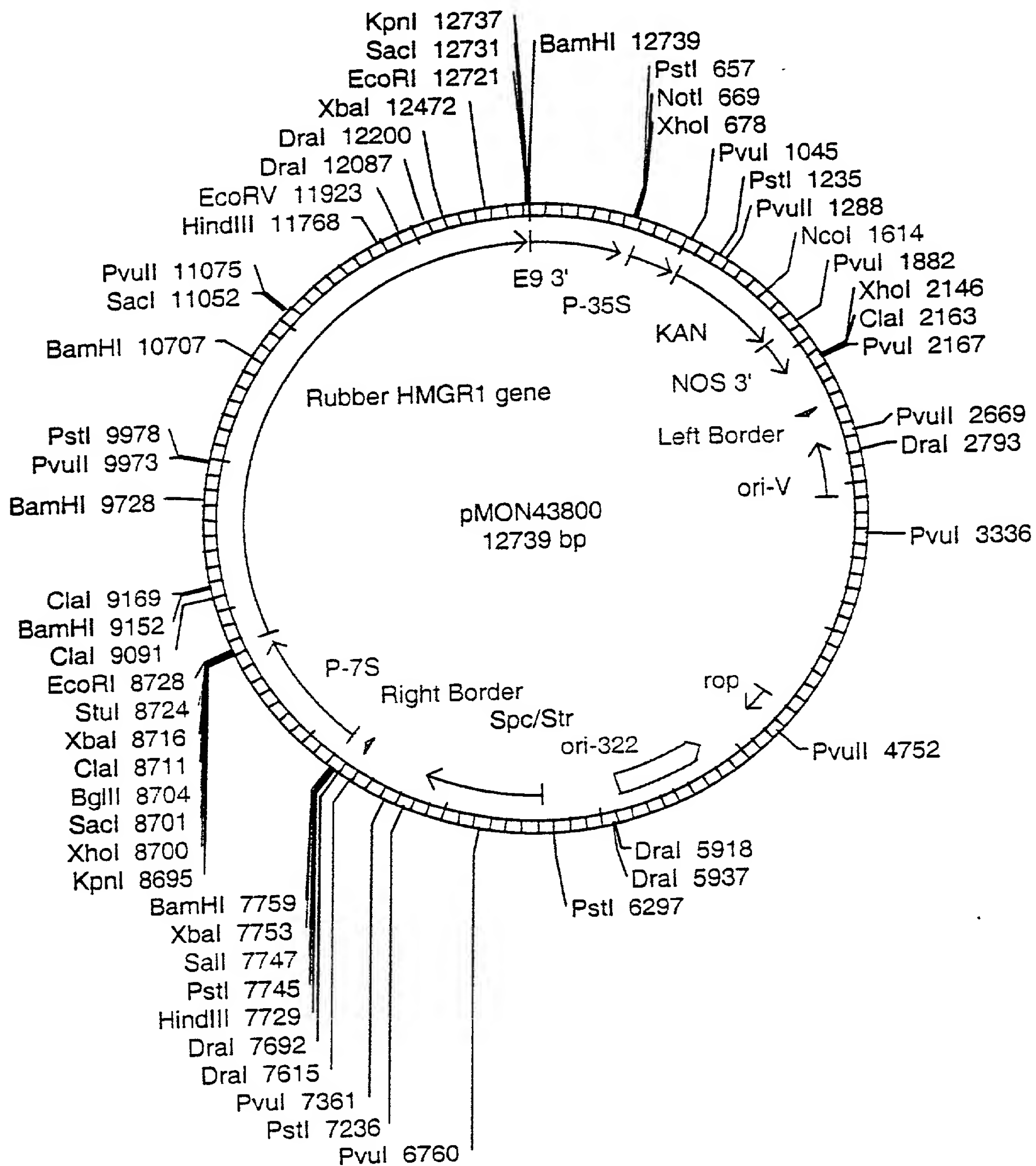


Figure 4: Construct pMON43800

5/78

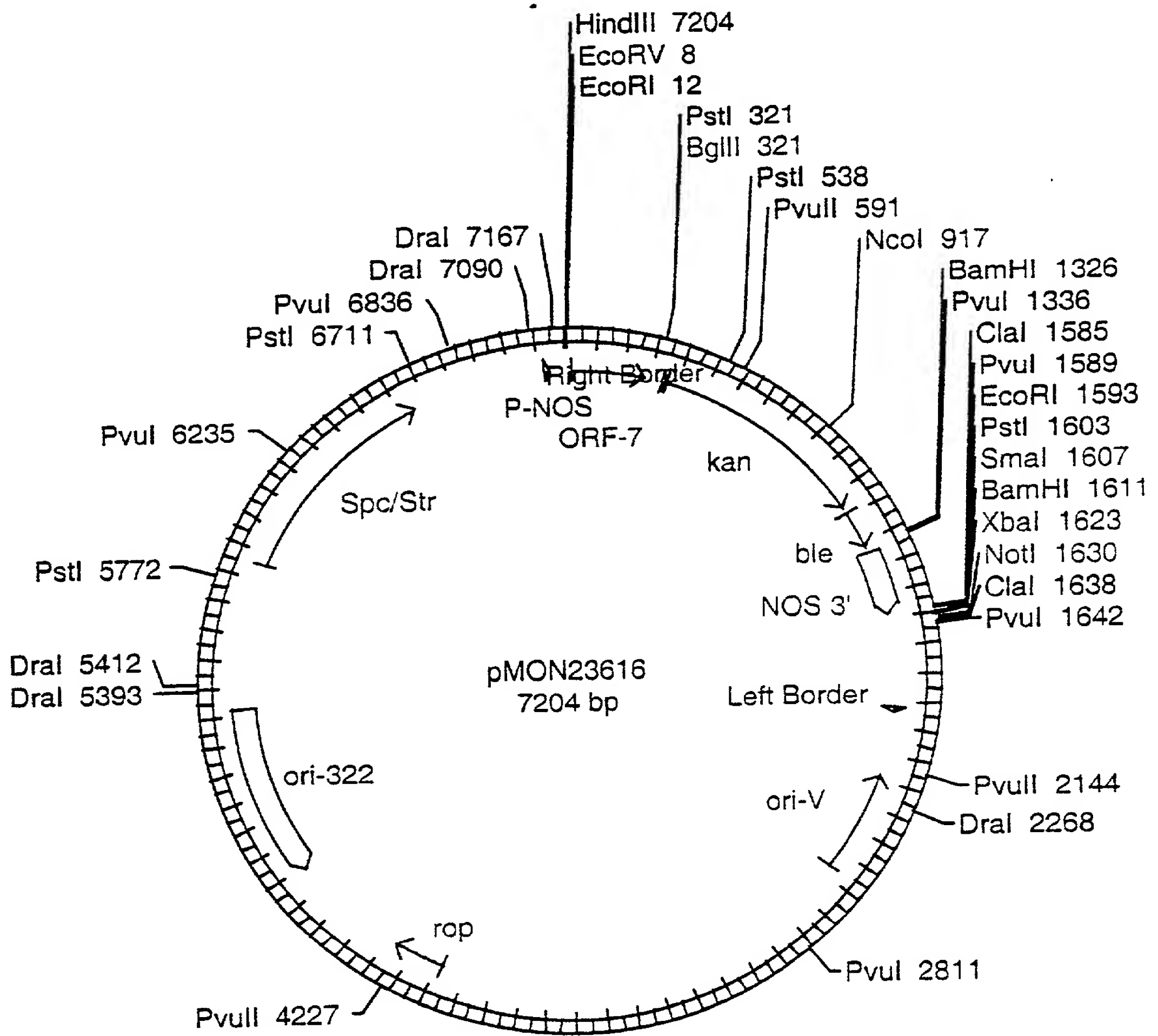


Figure 5: Construct pMON23616

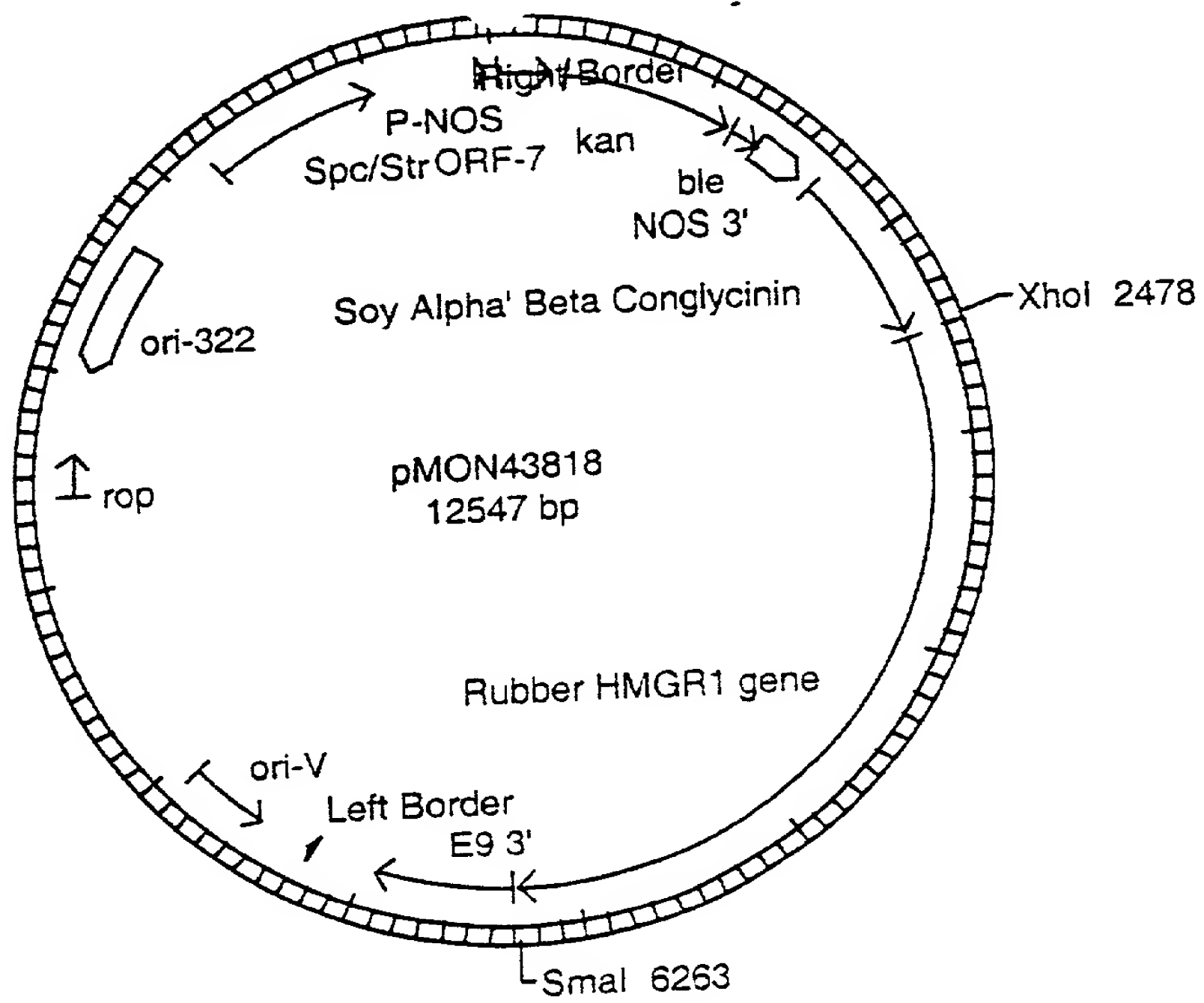


Figure 6: Construct pMON43818

7/78

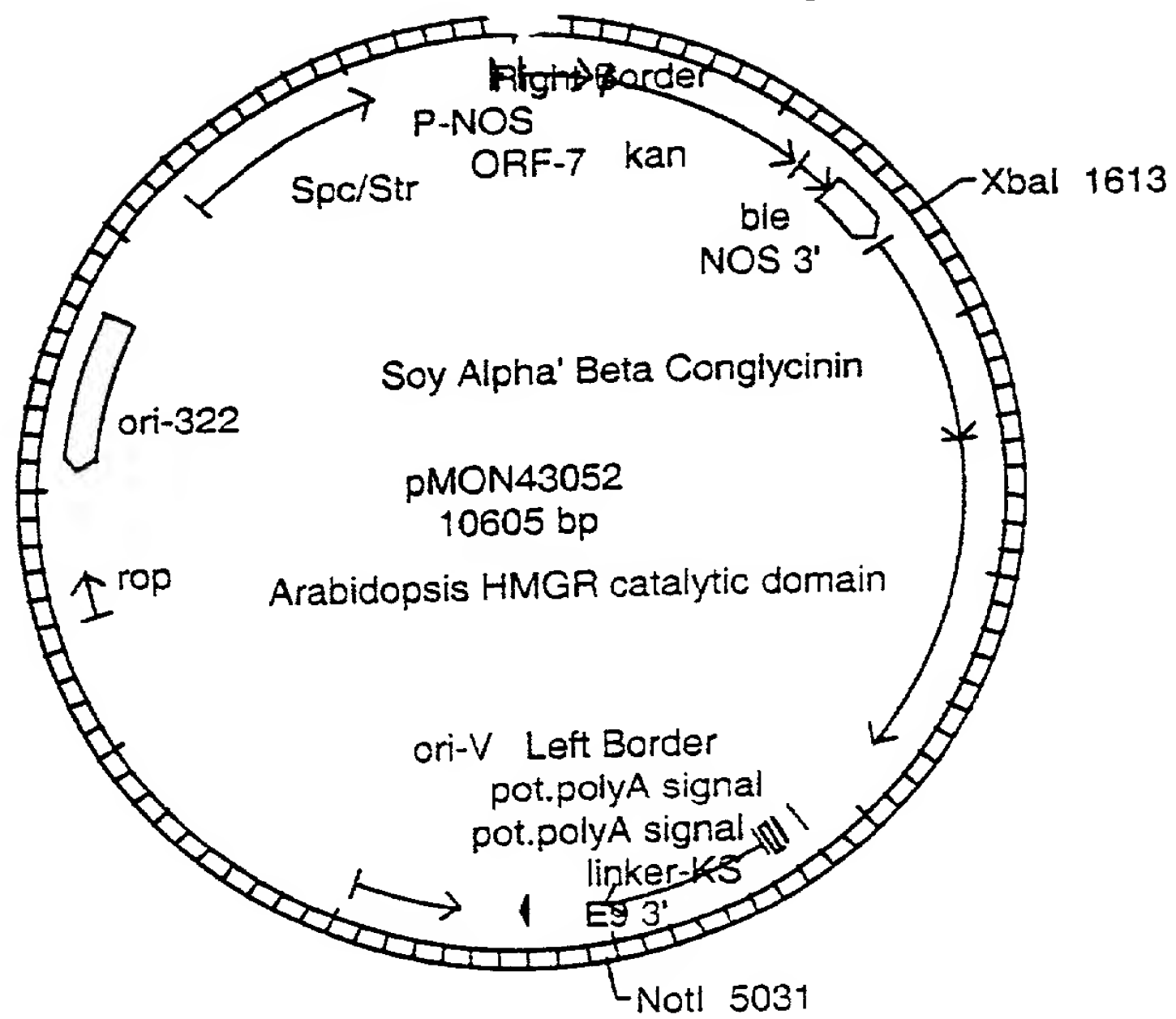


Figure 7: Construct pMON43052

8/78

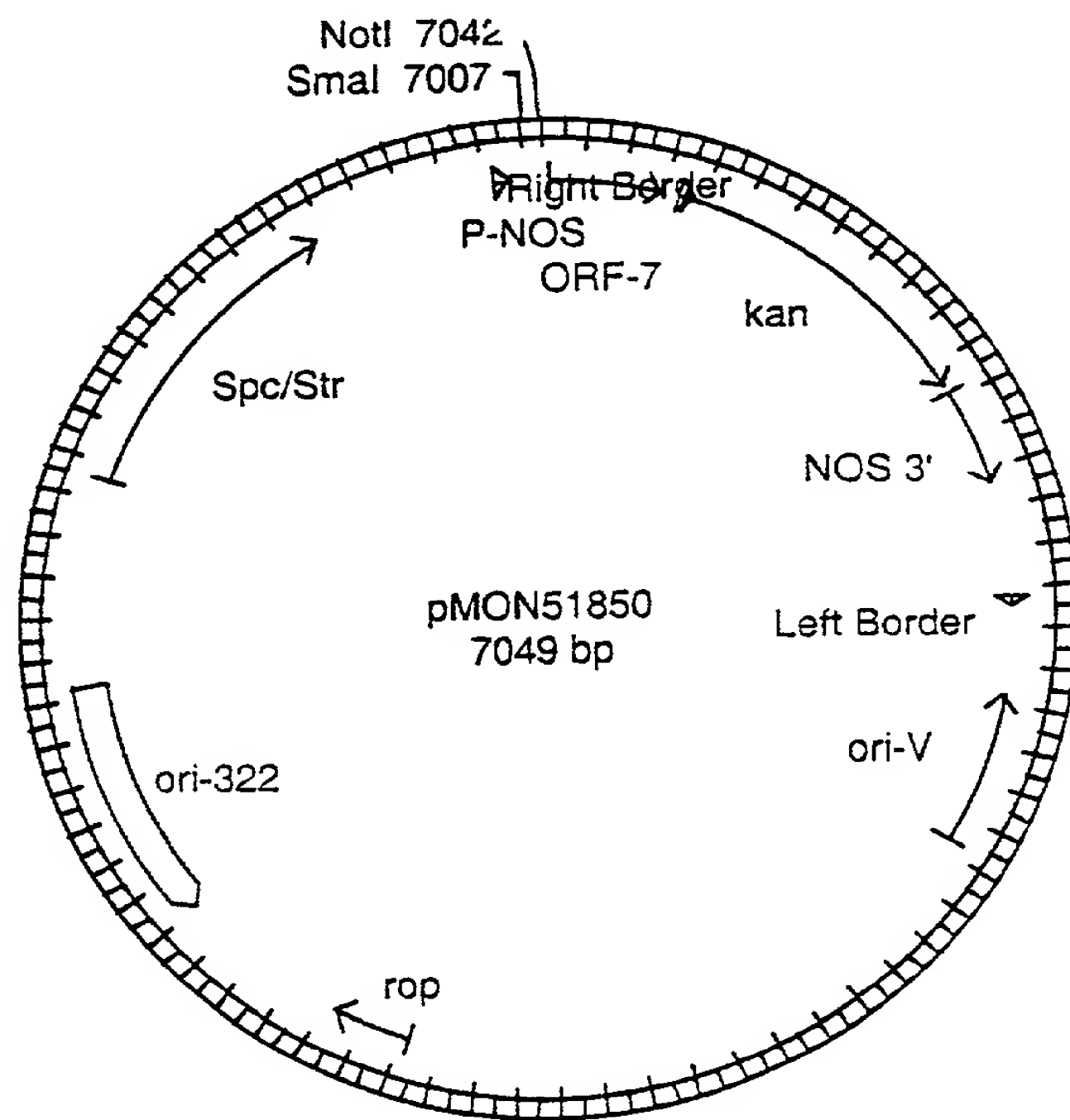


Figure 8: Construct pMON51850



9/78

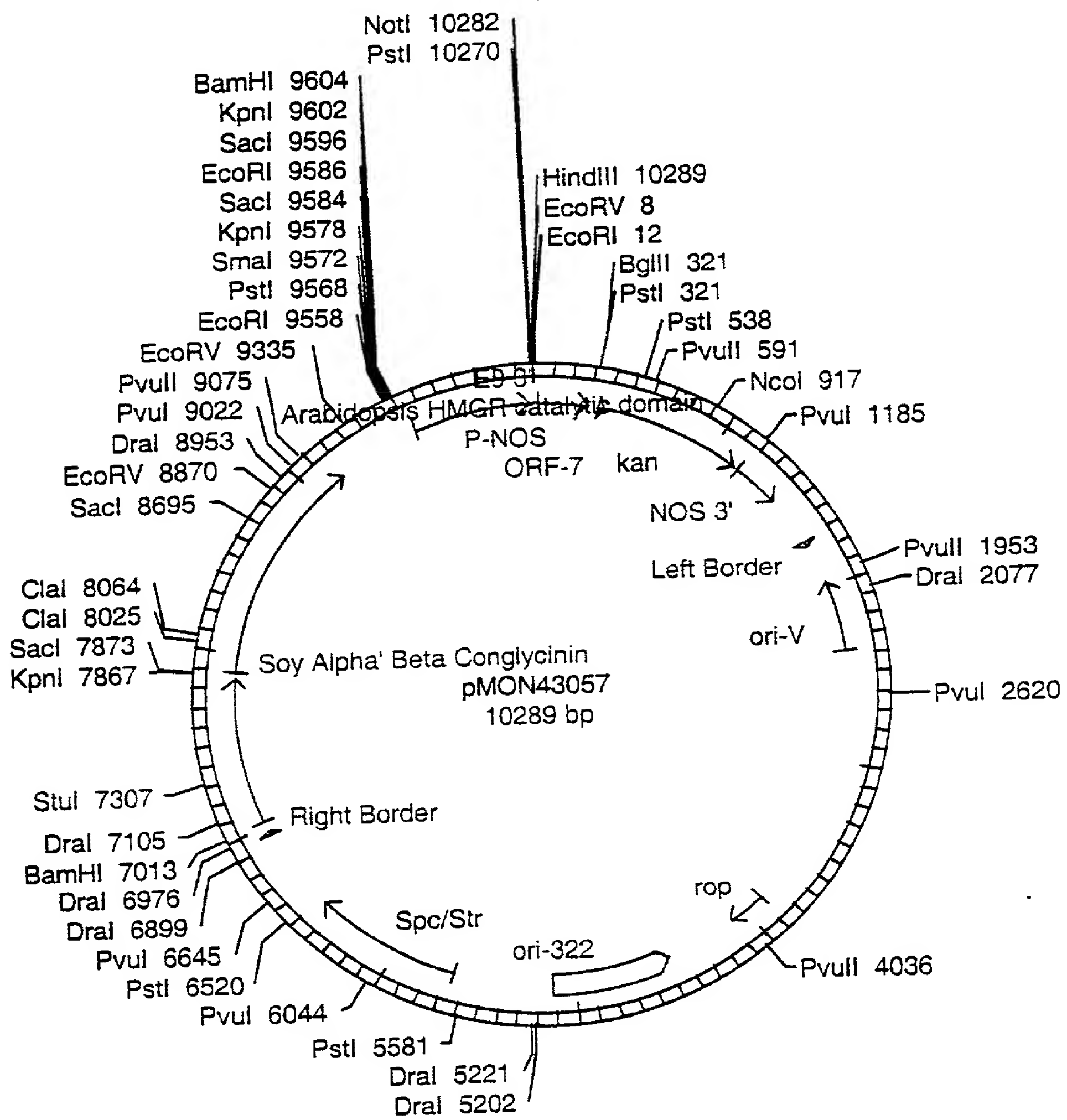


Figure 9: Construct pMON43057

10/78

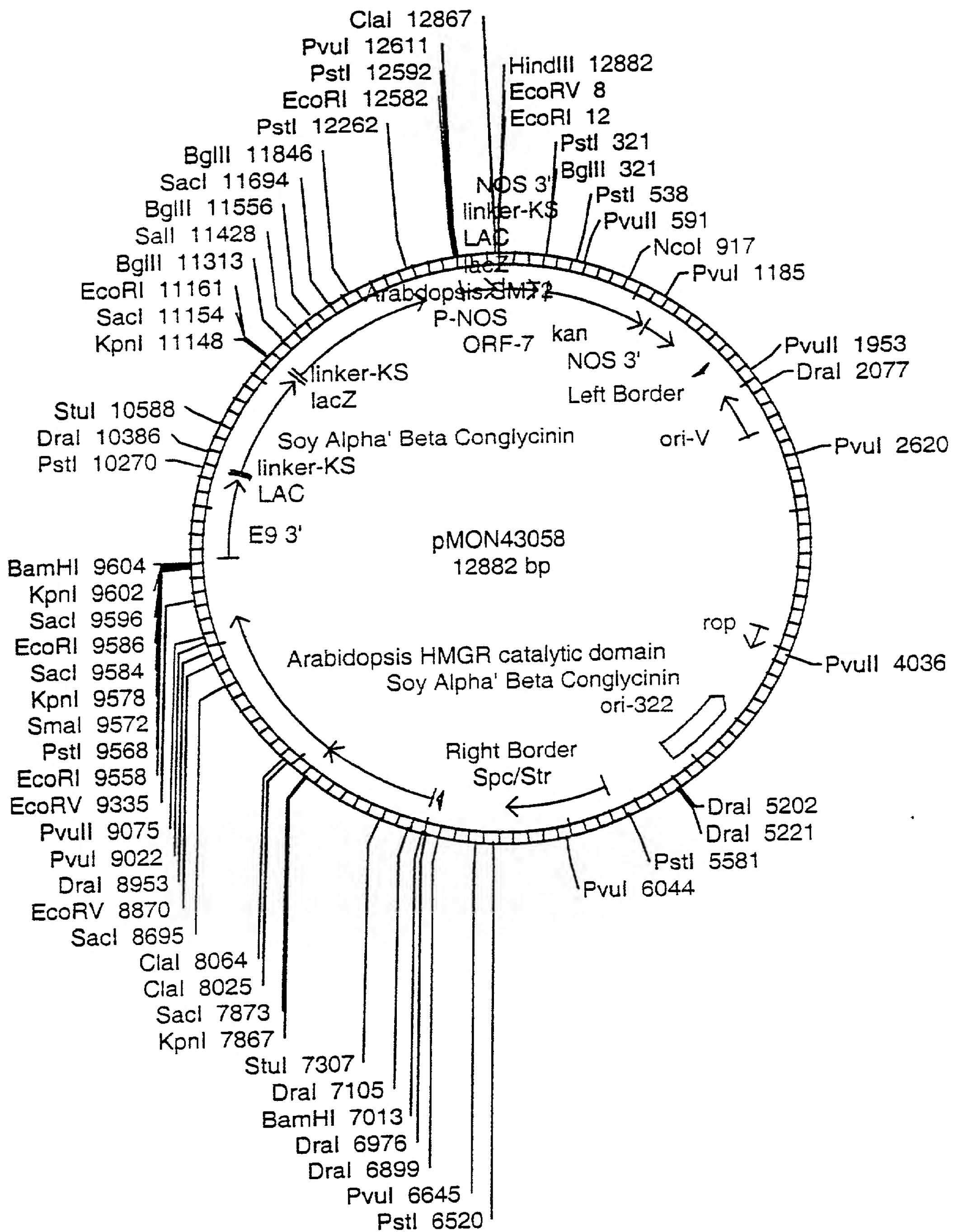


Figure 10: Construct pMON43058

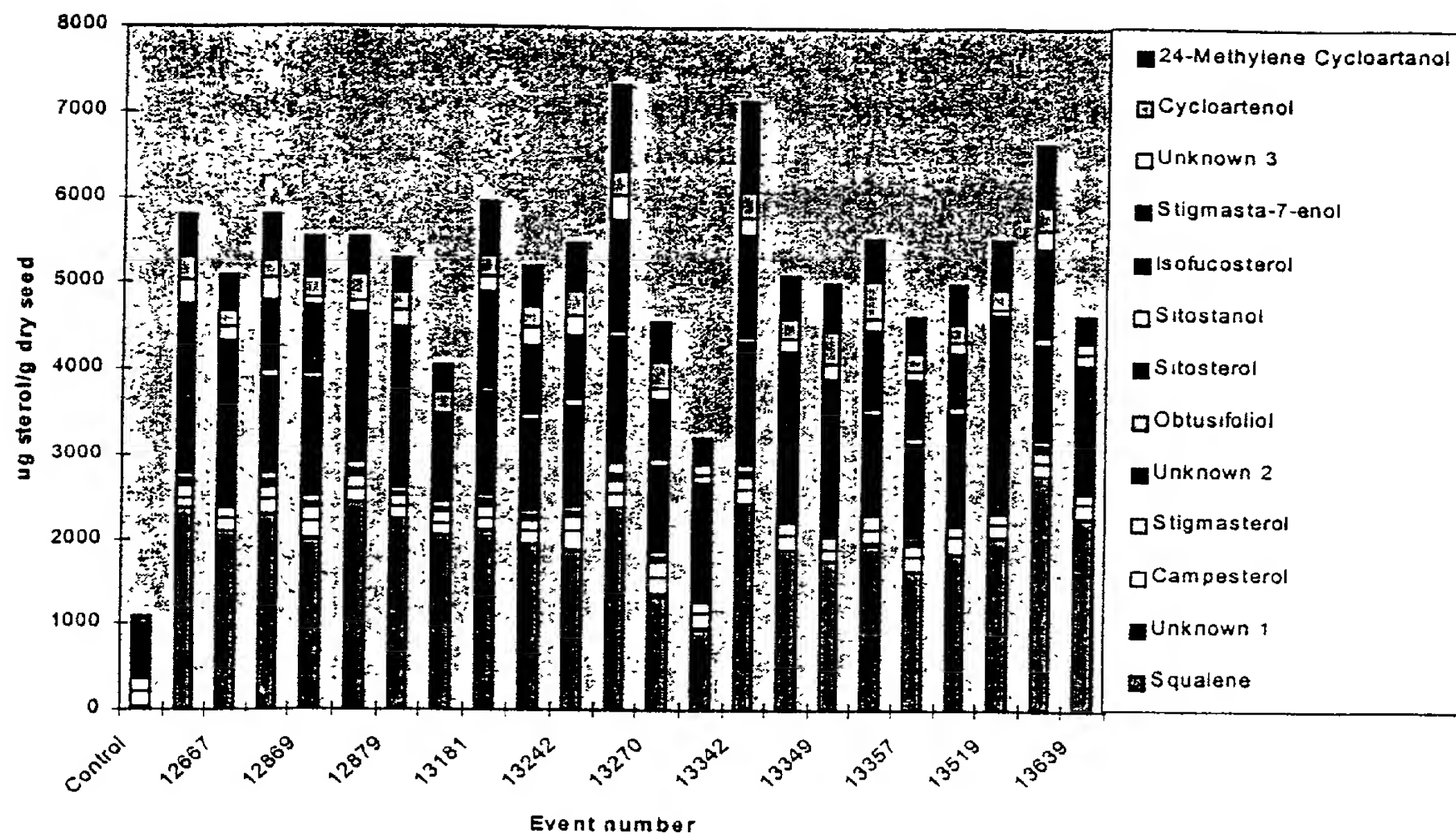


Figure 11: Sterol composition of R1 transgenic soybean seeds when *Arabidopsis* truncated HMGR (catalytic domain without linker) was overexpressed using seed-specific 7S promoter ( data from pMON43057: p7s::At HMGR truncated).

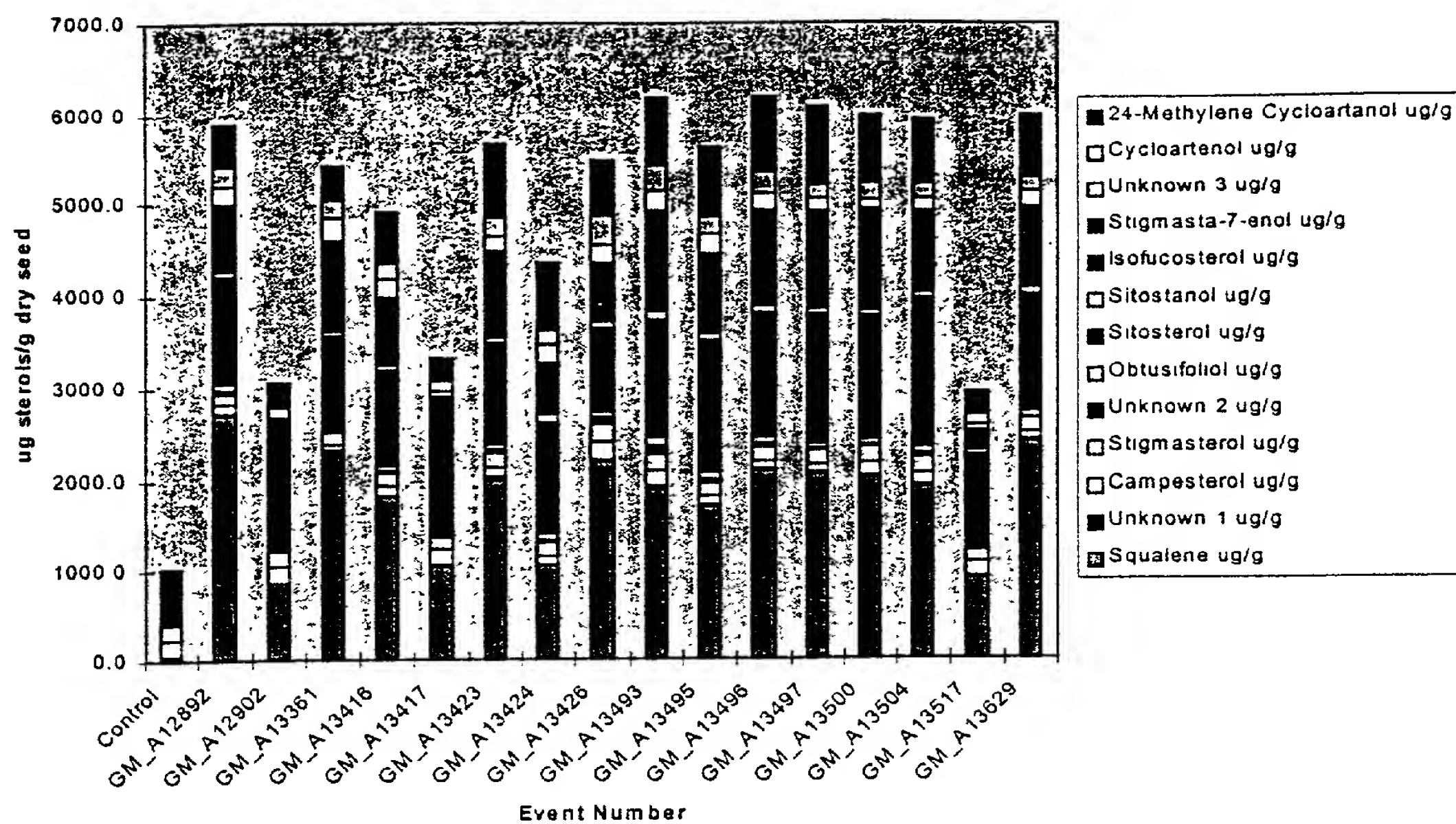


Figure 12: Sterol composition of R1 transgenic soybean seeds when *Arabidopsis* truncated HMGR (catalytic domain without linker) and *Arabidopsis* SMTII were overexpressed (data from pMON43058: p7S::*At* HMGR truncated & p7S::*At* SMTII). The expression of the genes is controlled by the seed-specific 7S promoter.

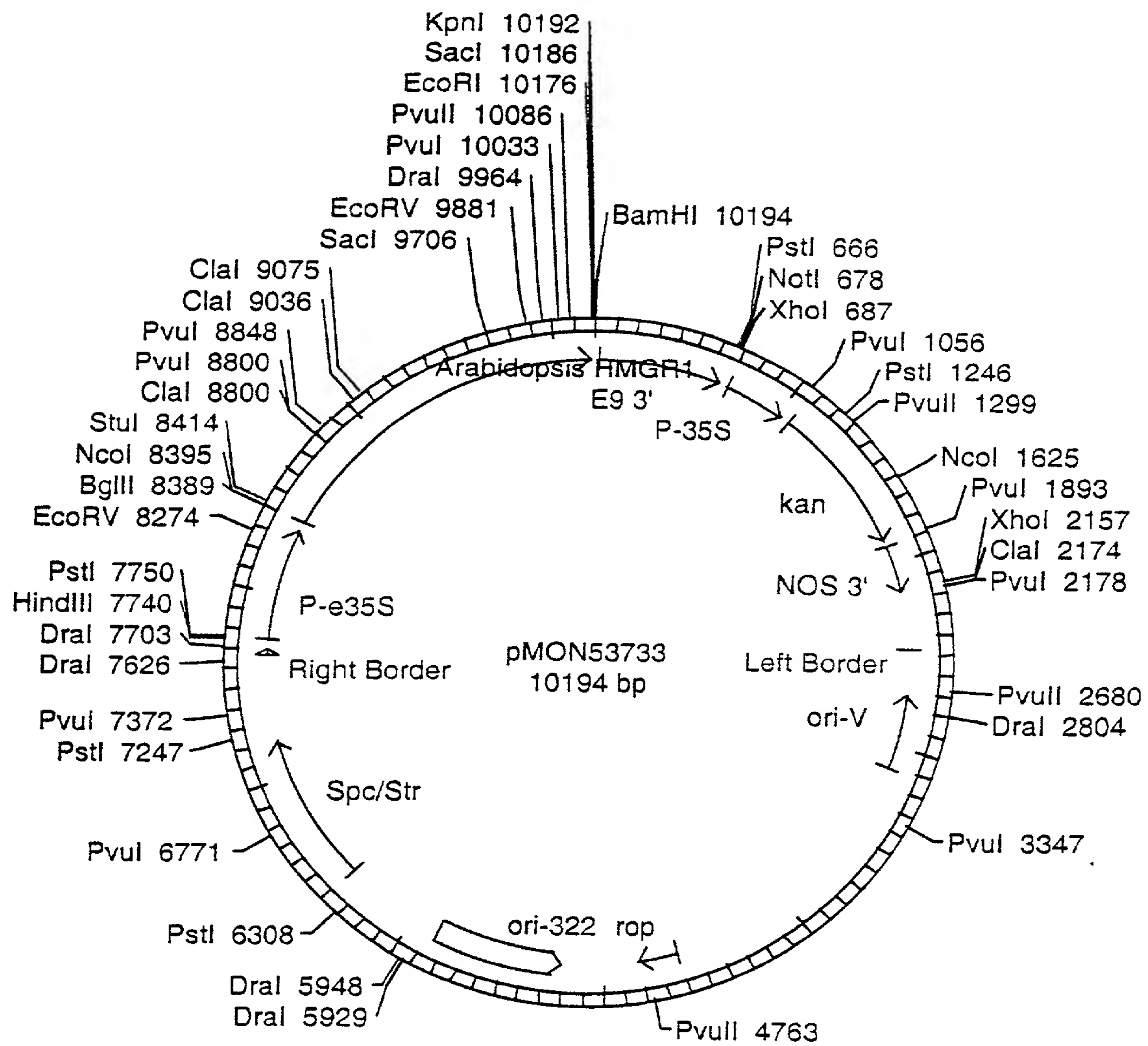


Figure 13: Construct pMON53733



14/78

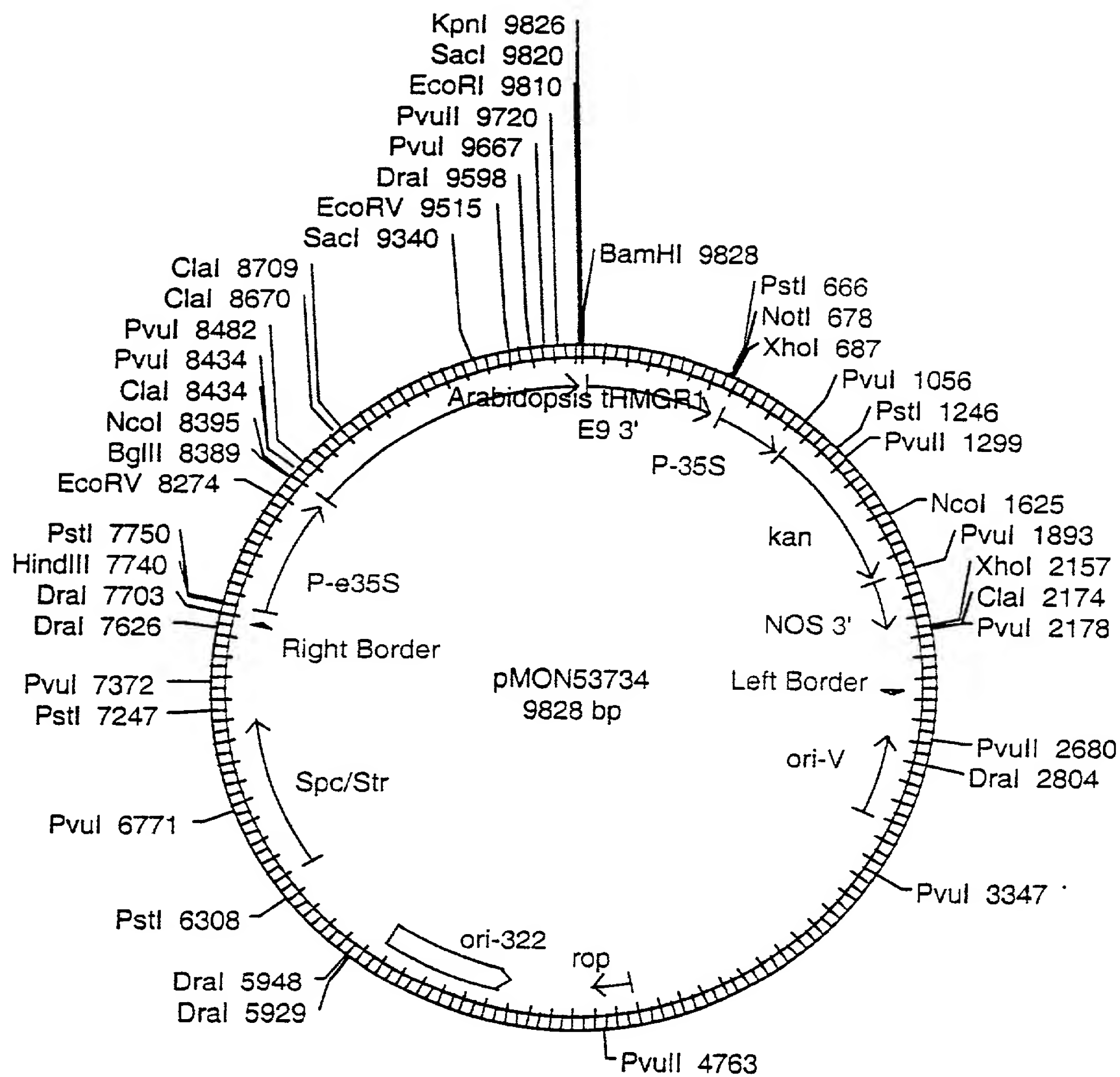


Figure 14: Construct pMON53734

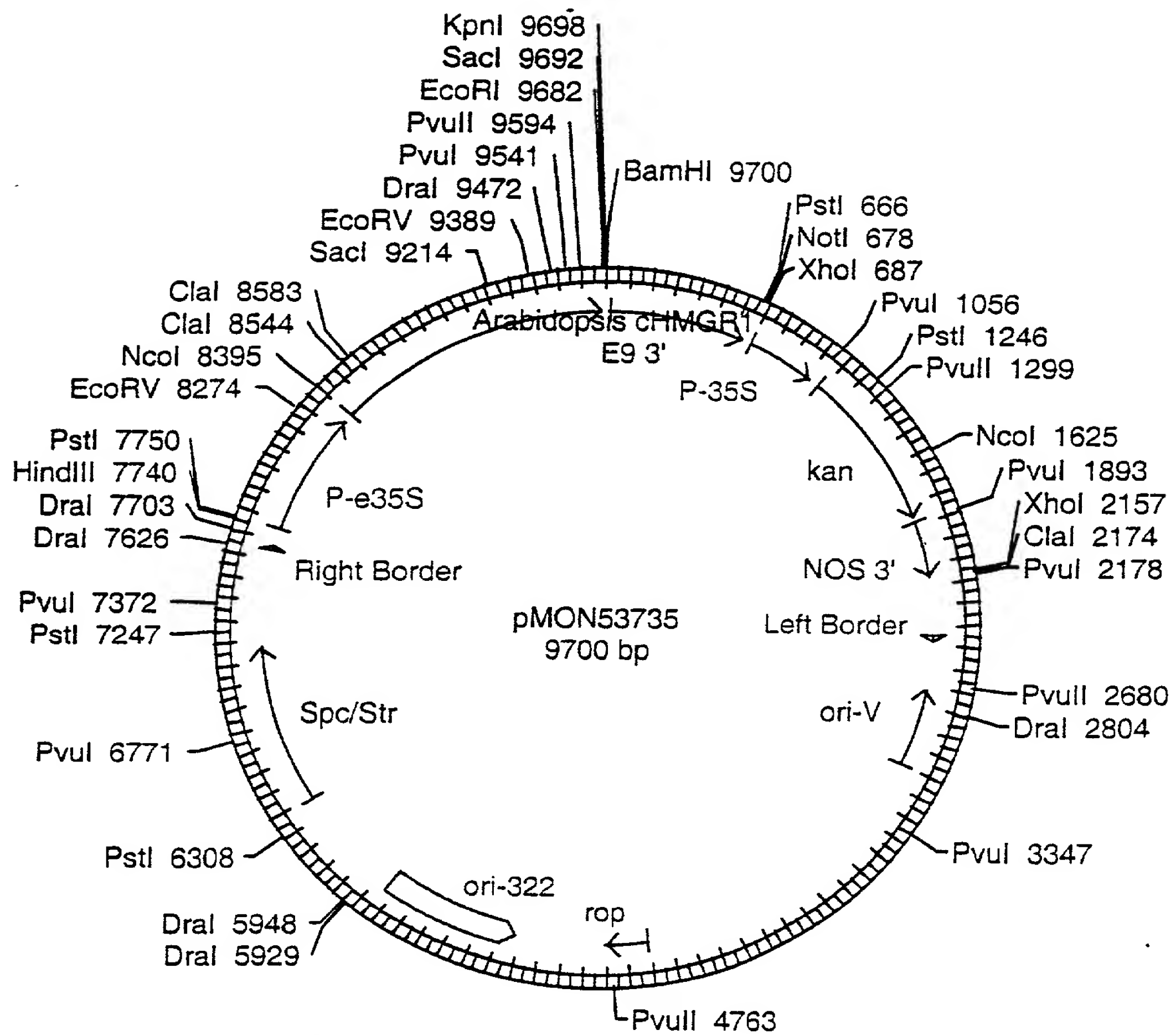


Figure 15: Construct pMON53735

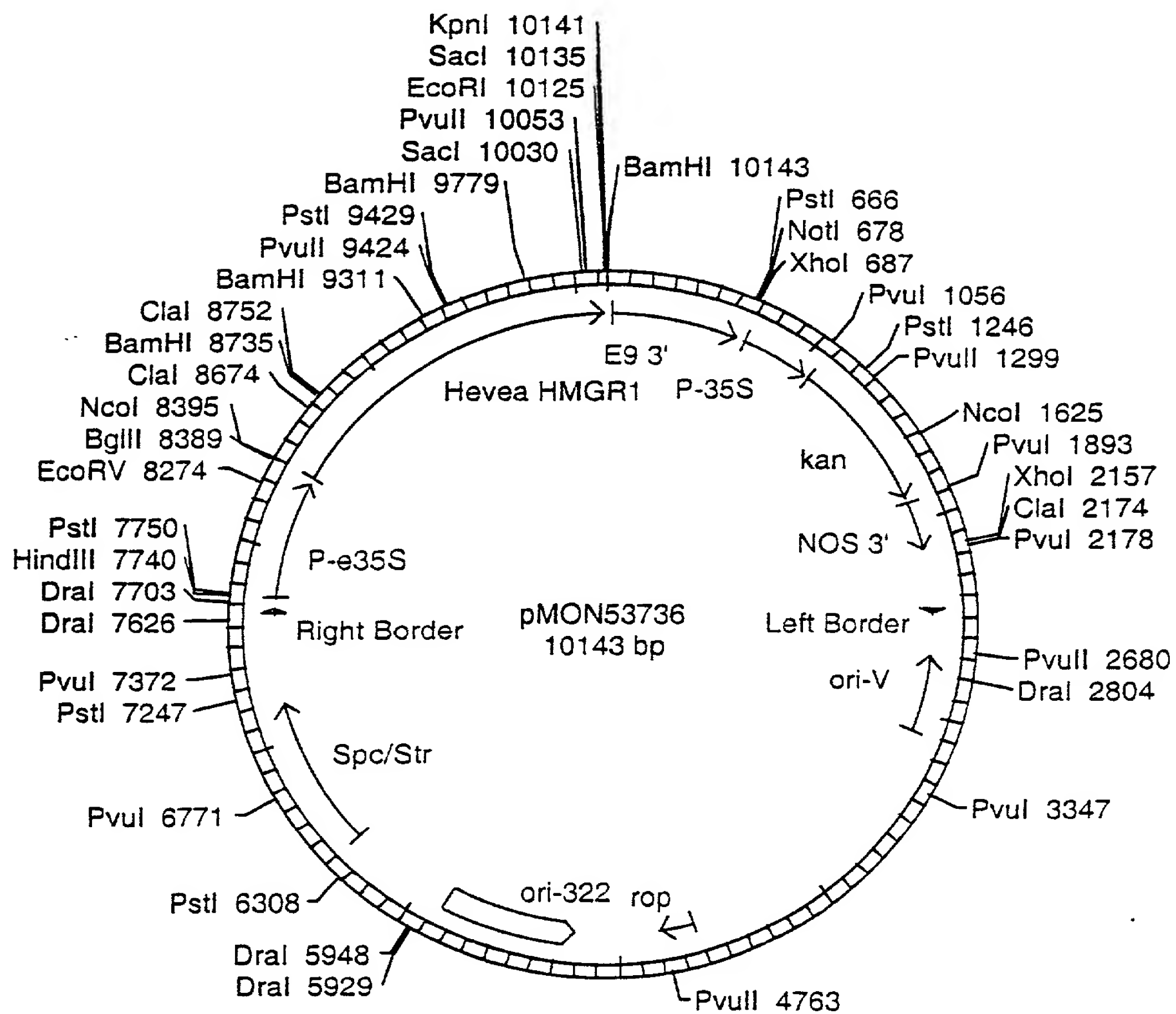


Figure 16: Construct pMON53736



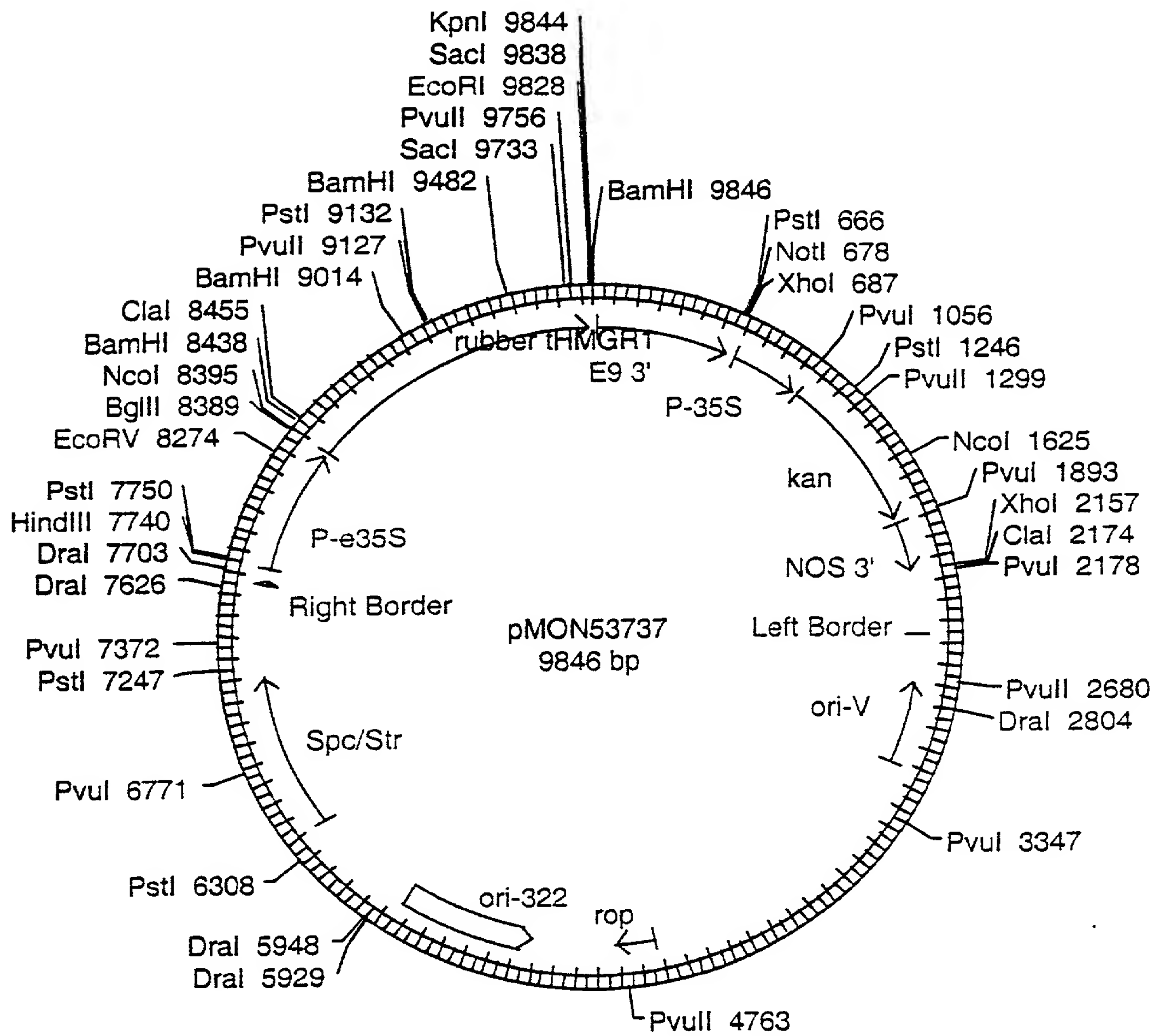


Figure 17: Construct pMON53737

18/78

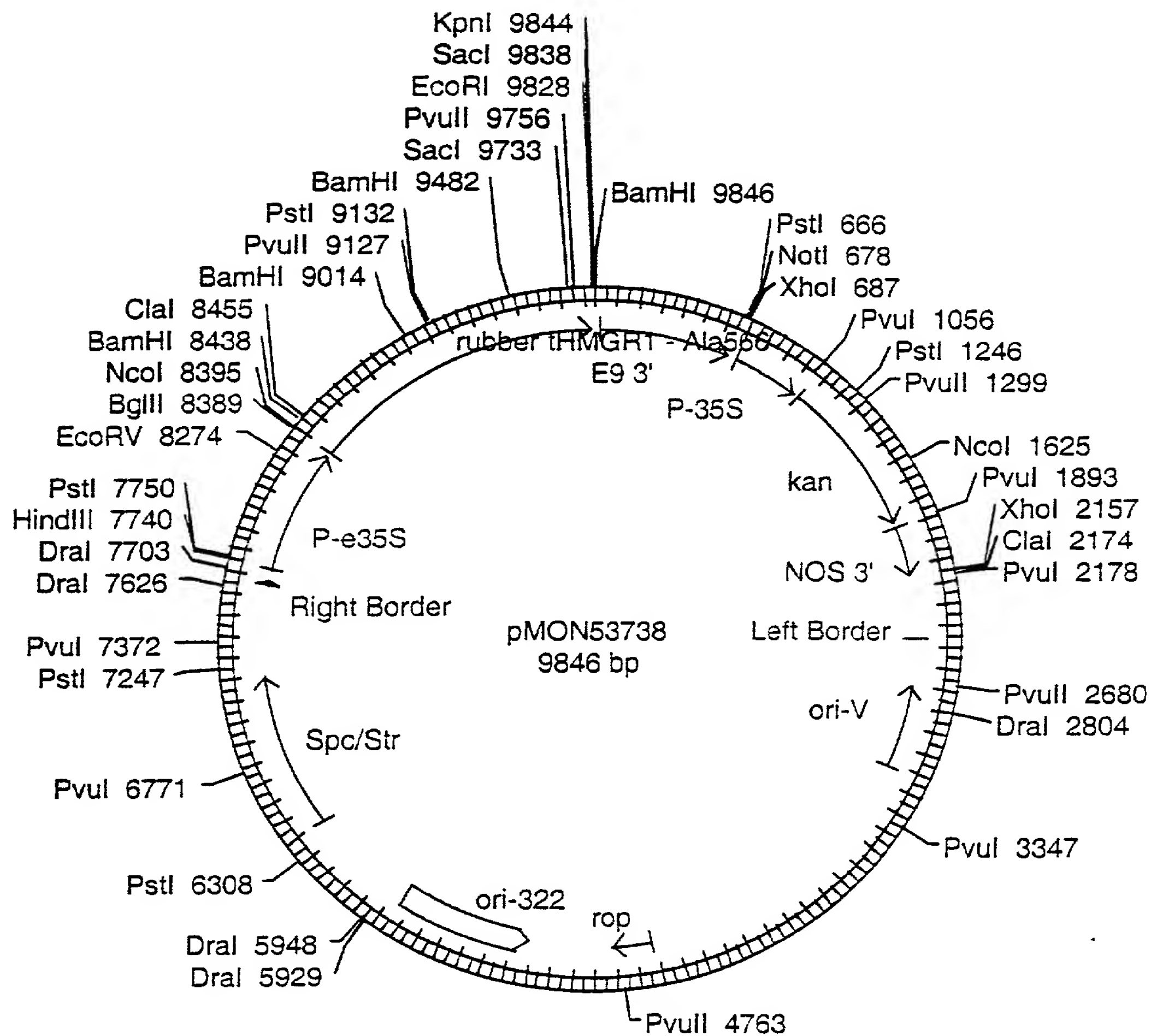


Figure 18: Construct pMON53738

19/78

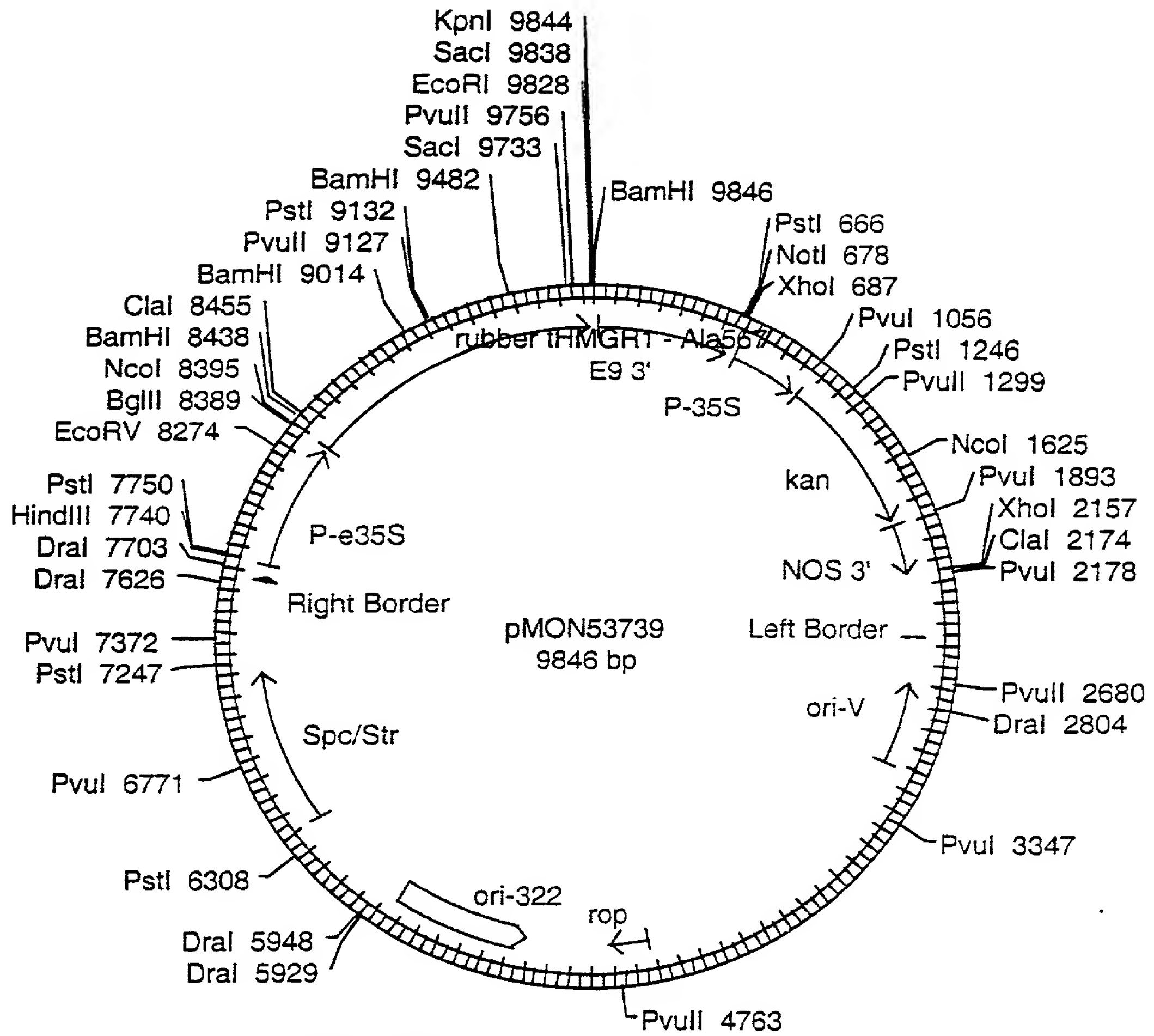


Figure 19: Construct pMON53739

20/78

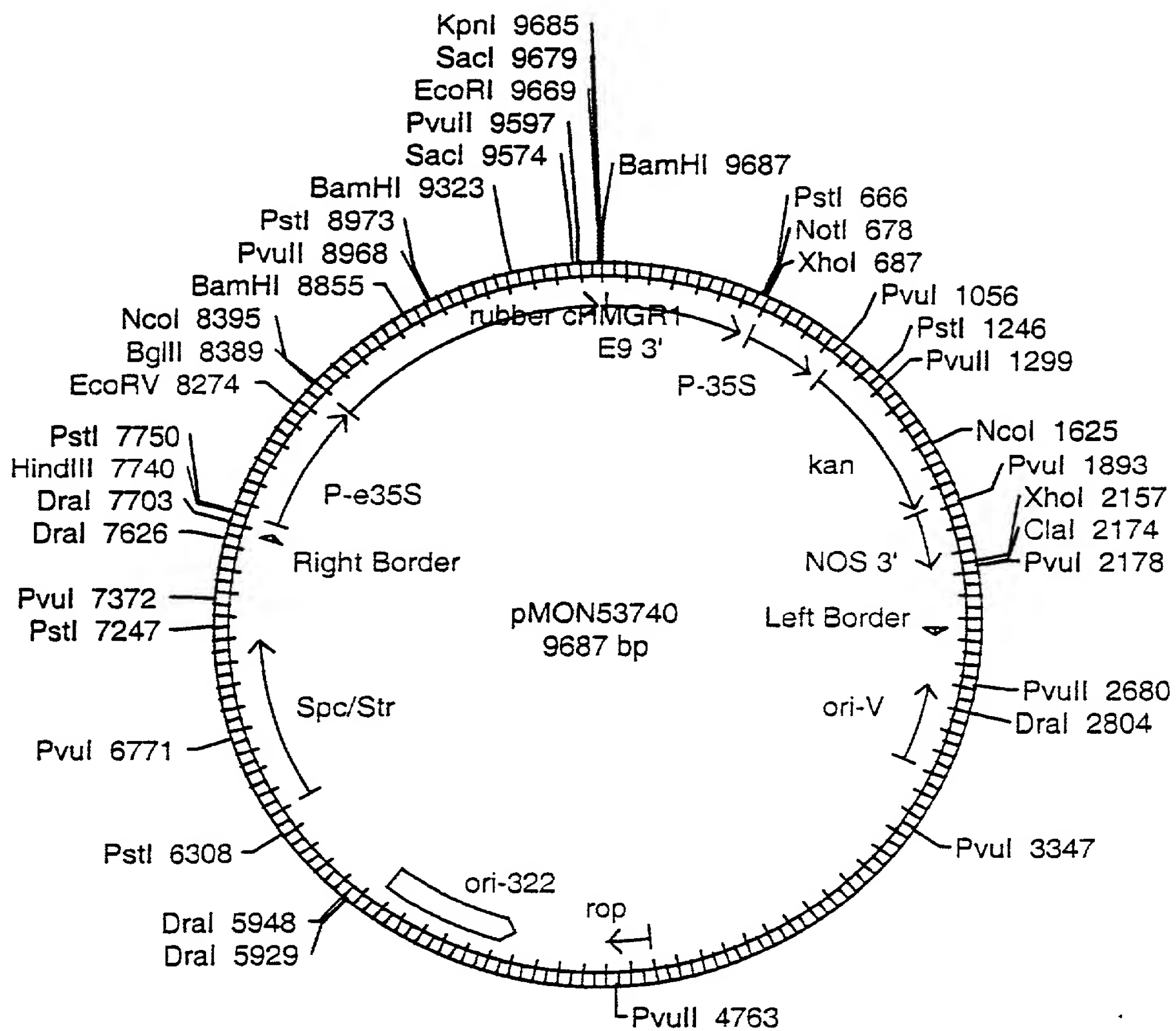


Figure 20: Construct pMON53740

FIG. 21

# Comparison of Cycloartenol Levels in Transgenic Plants

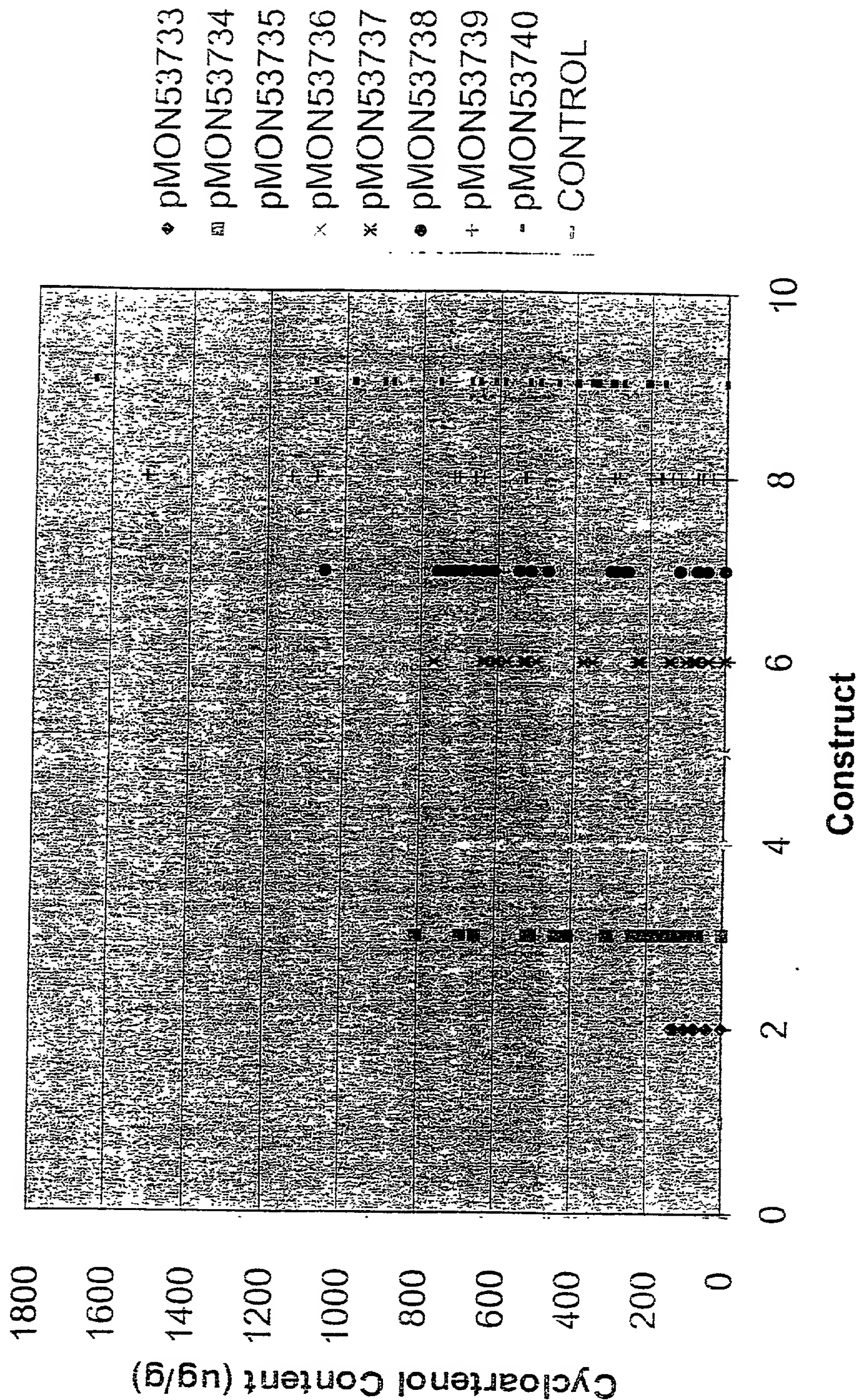




FIG. 22

Comparison of 24-Methylene Cycloartenol in Transgenic Plants

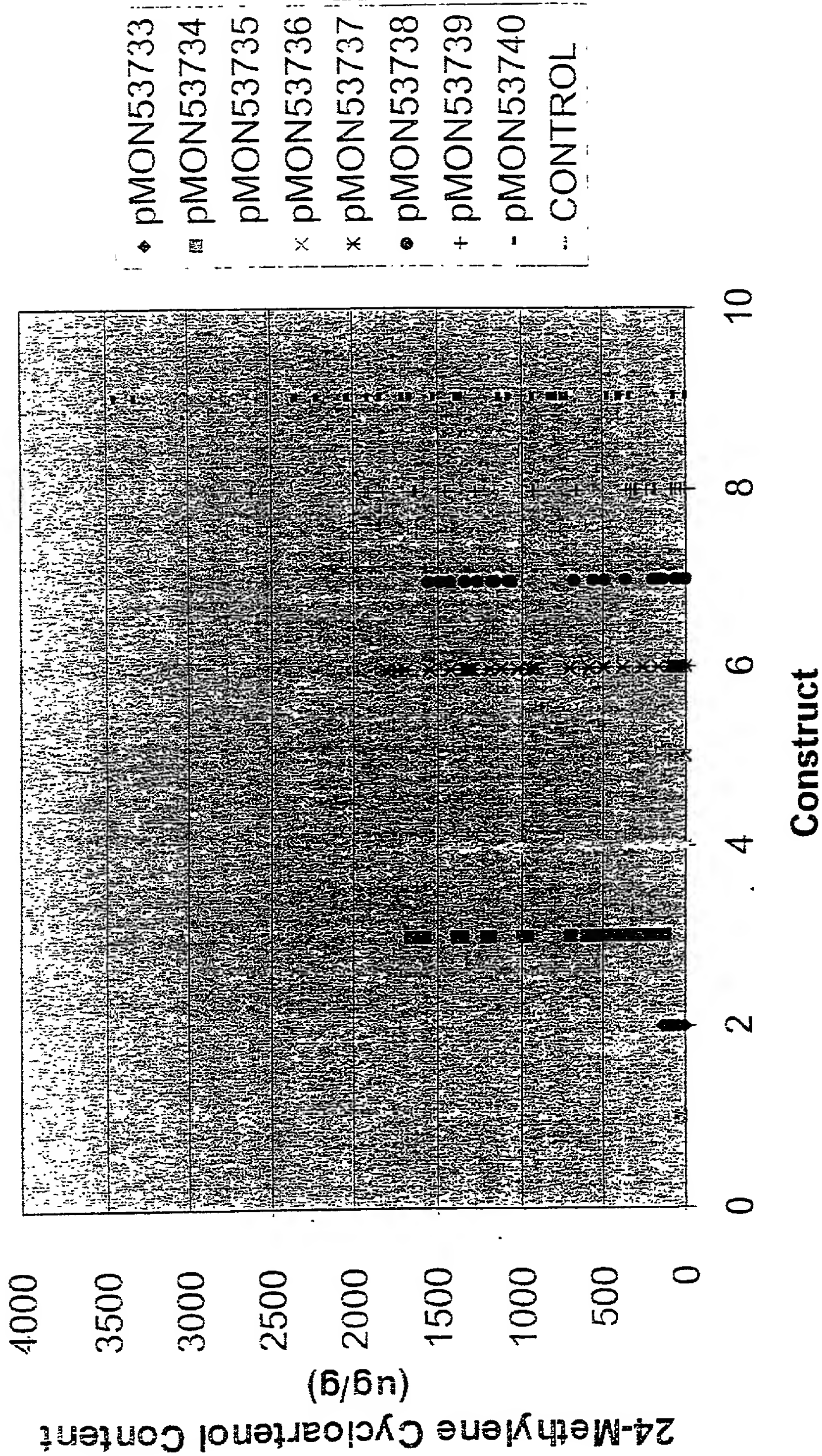
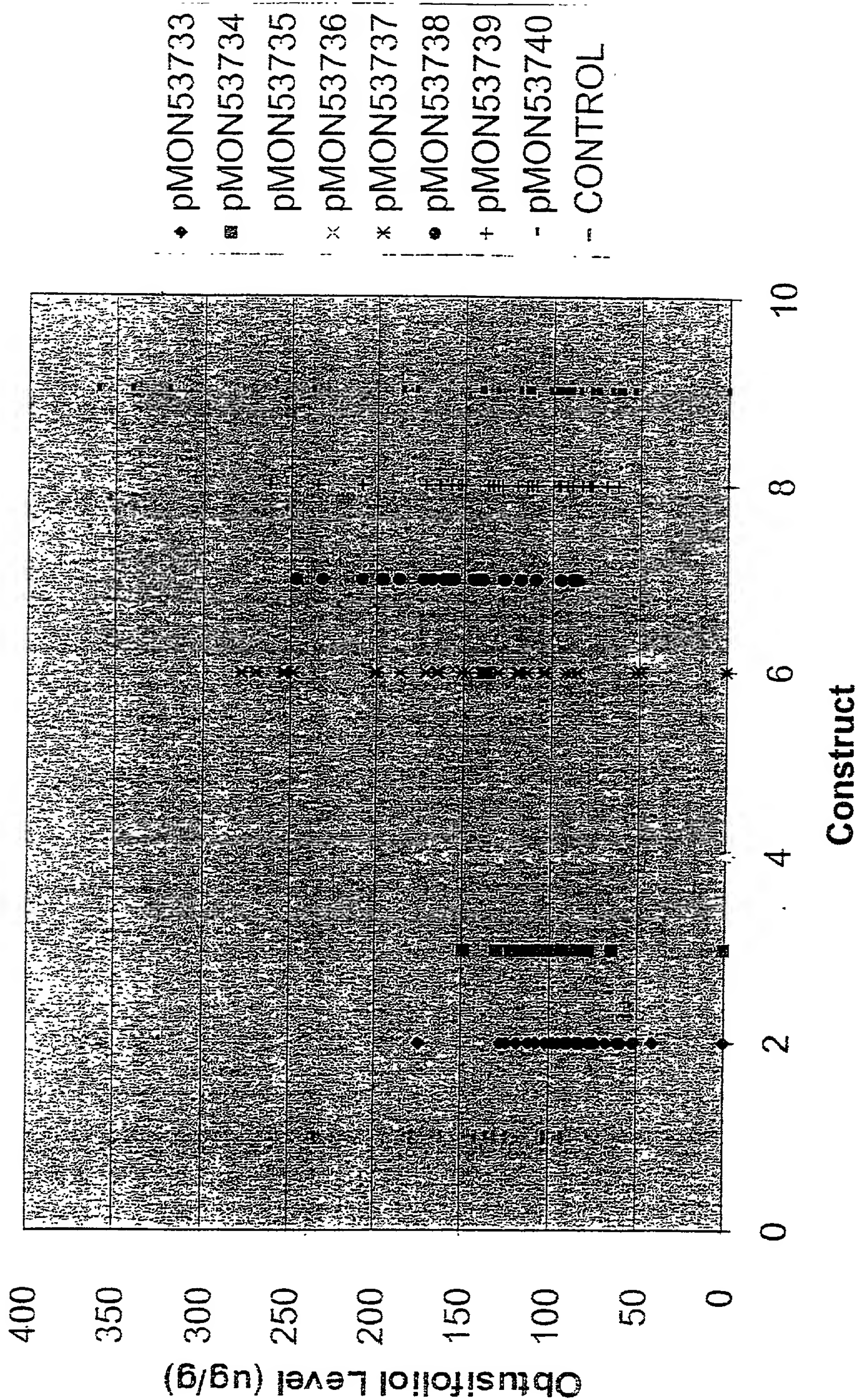


FIG. 23

# Comparison of Obtusifolioside Levels in Transgenic Plants





24/78

FIG. 24

# Comparison of Campesterol Levels in Transgenic Plants

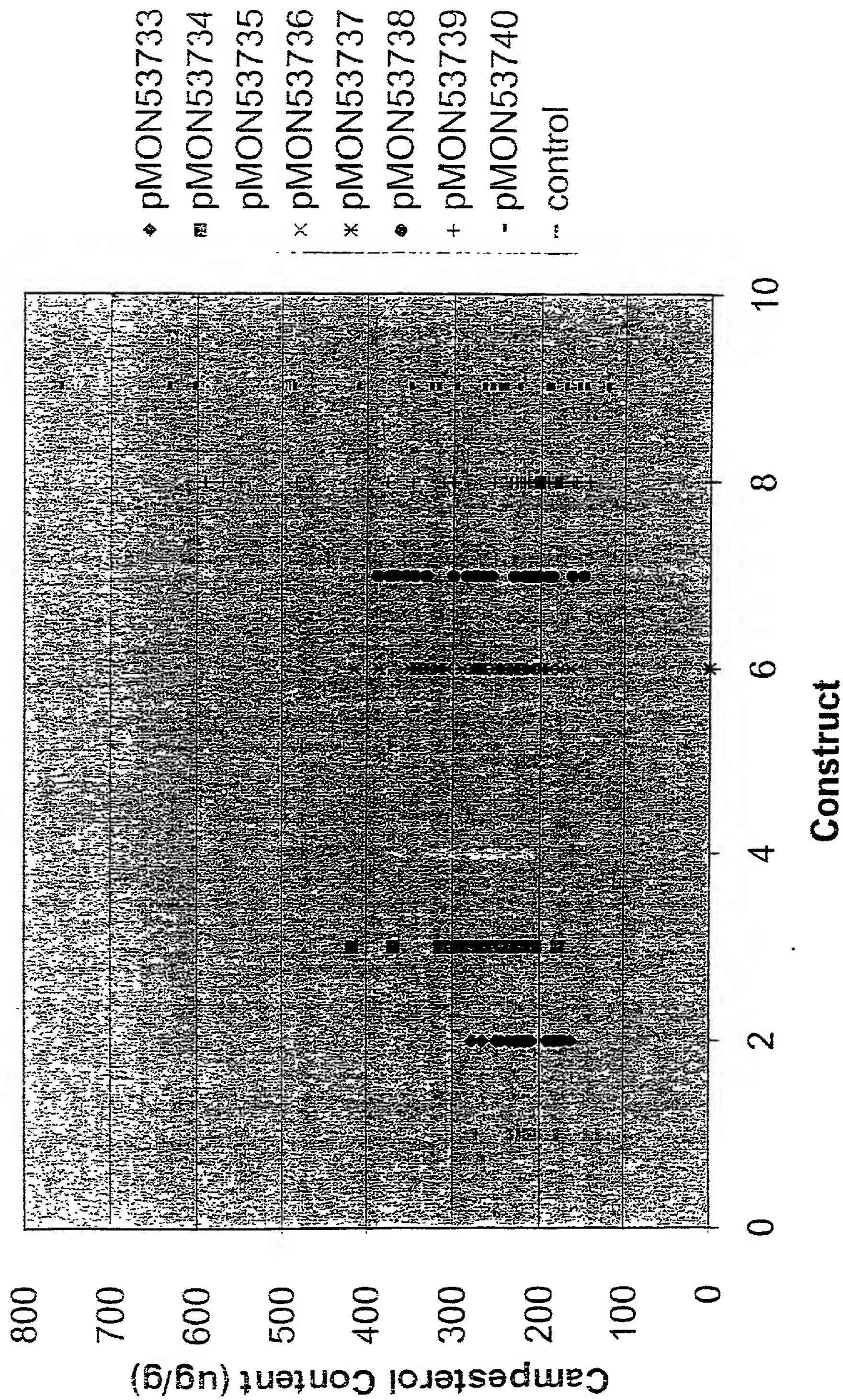




FIG. 25

# Comparison of Sitosterol Levels in Transgenic Plants

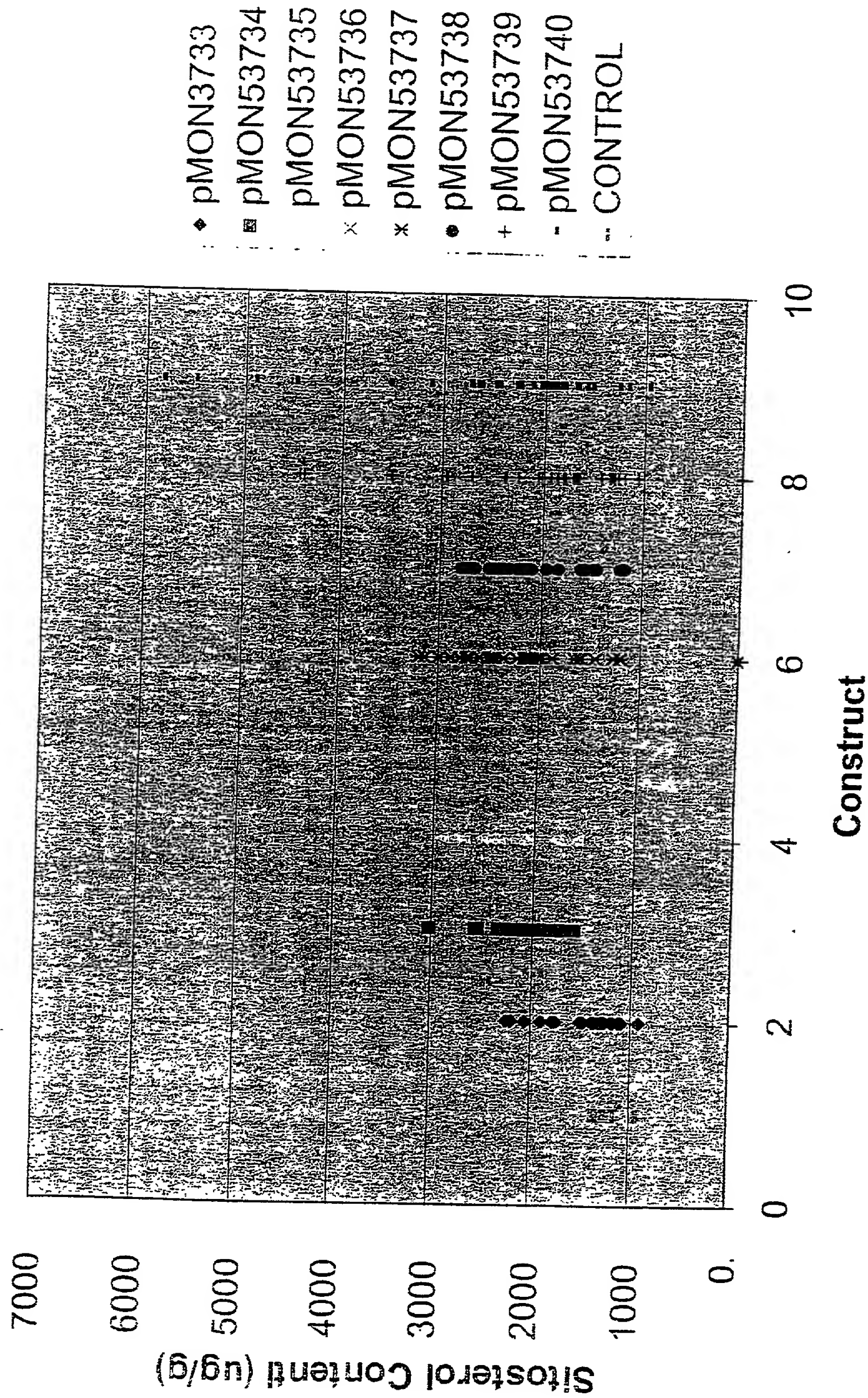
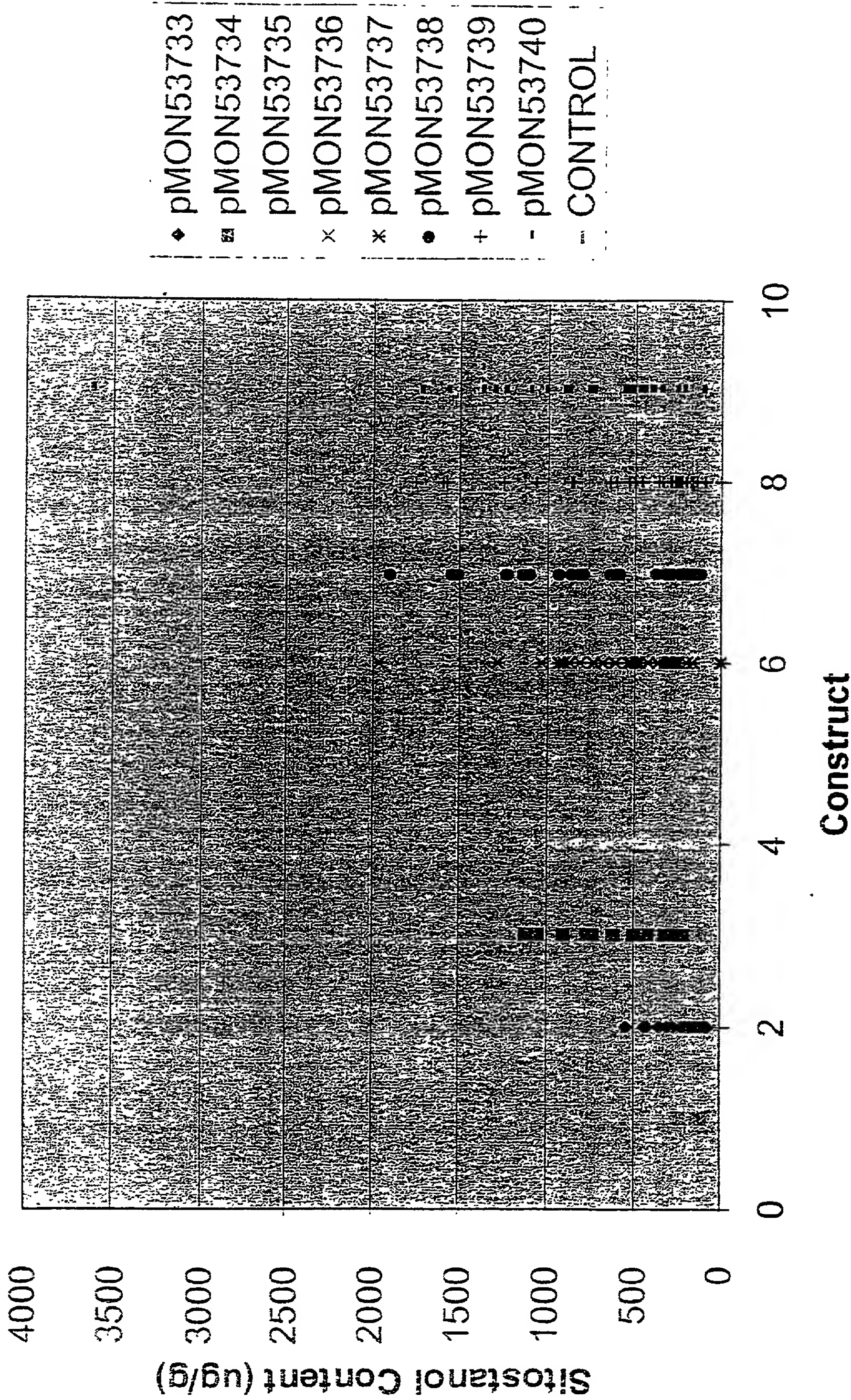




FIG. 26

# Comparison of Sitostanol Levels in Transgenic Plants



27/78

FIG. 27

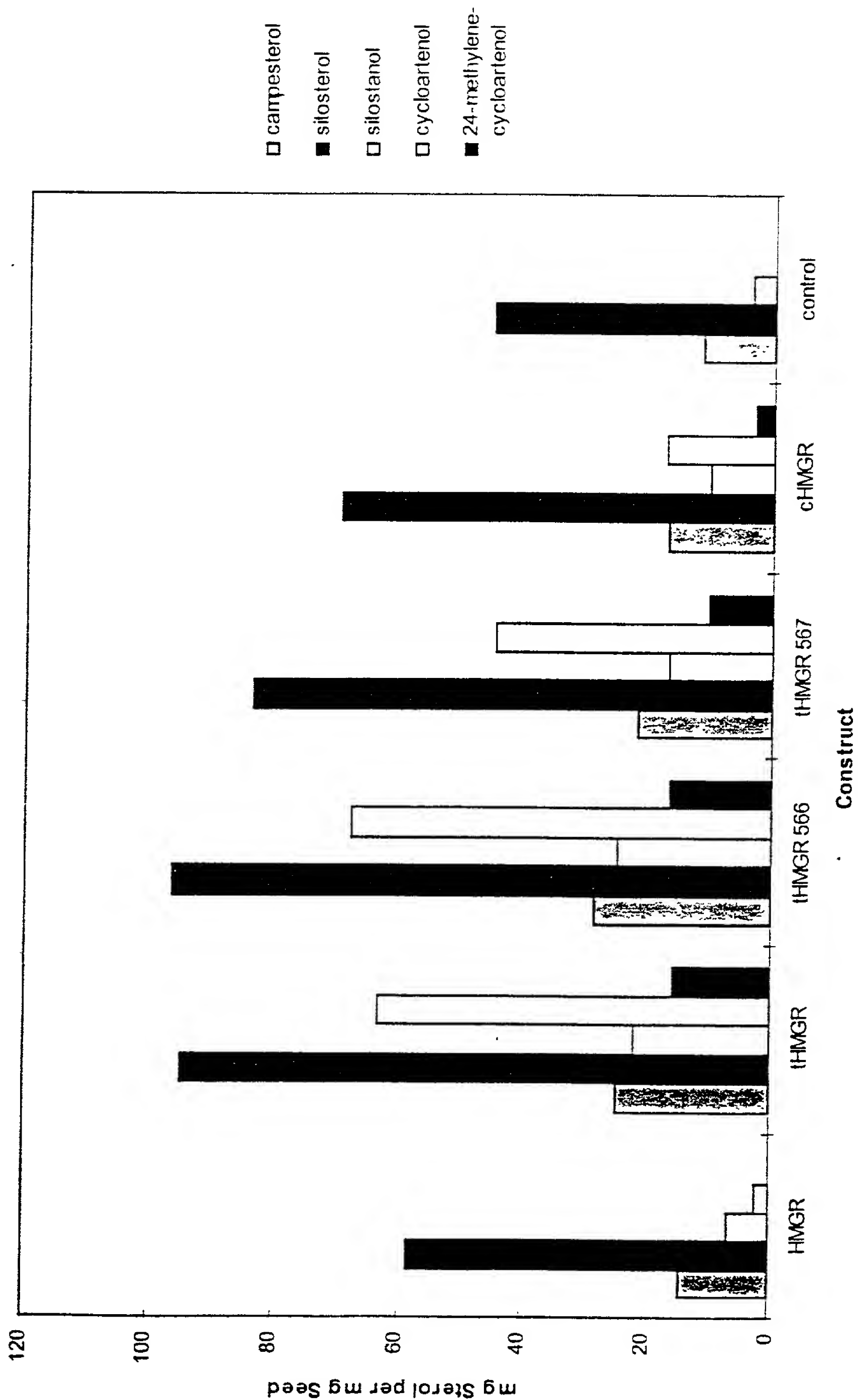
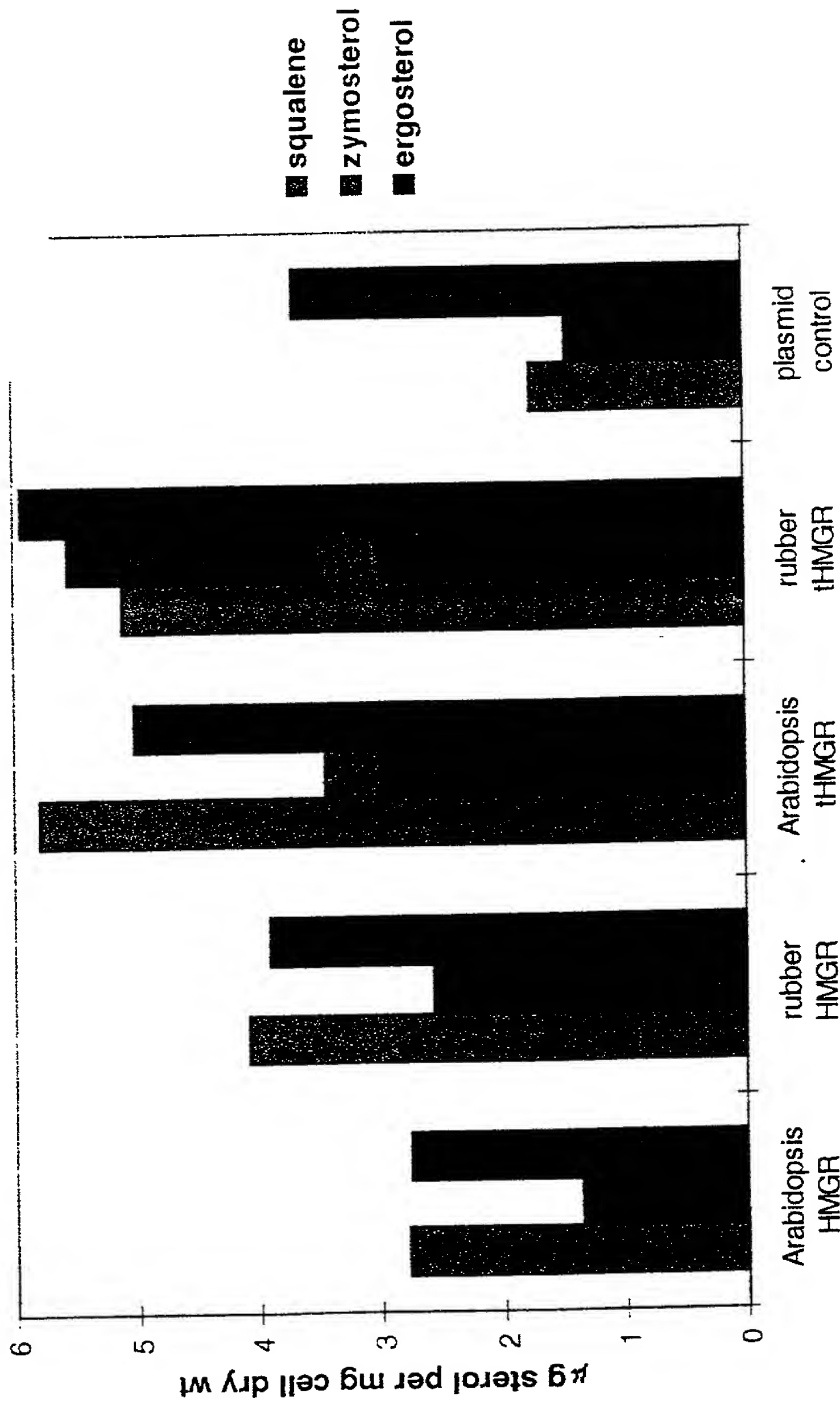


FIG. 28

# Plant HMGR Constructs in Yeast HMGR1 Knockout Mutant



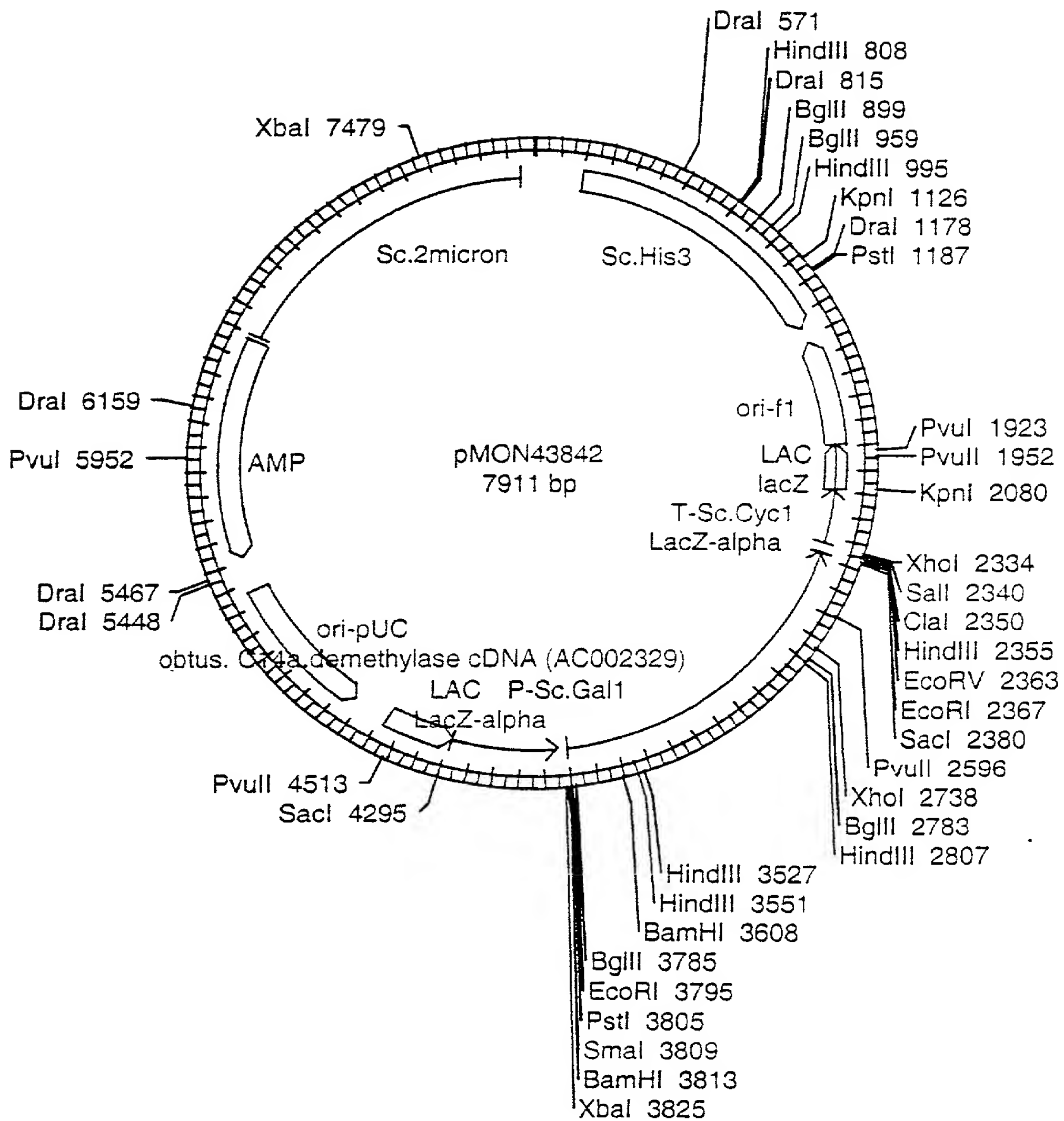


Figure 29: Construct pMON43842



30/78

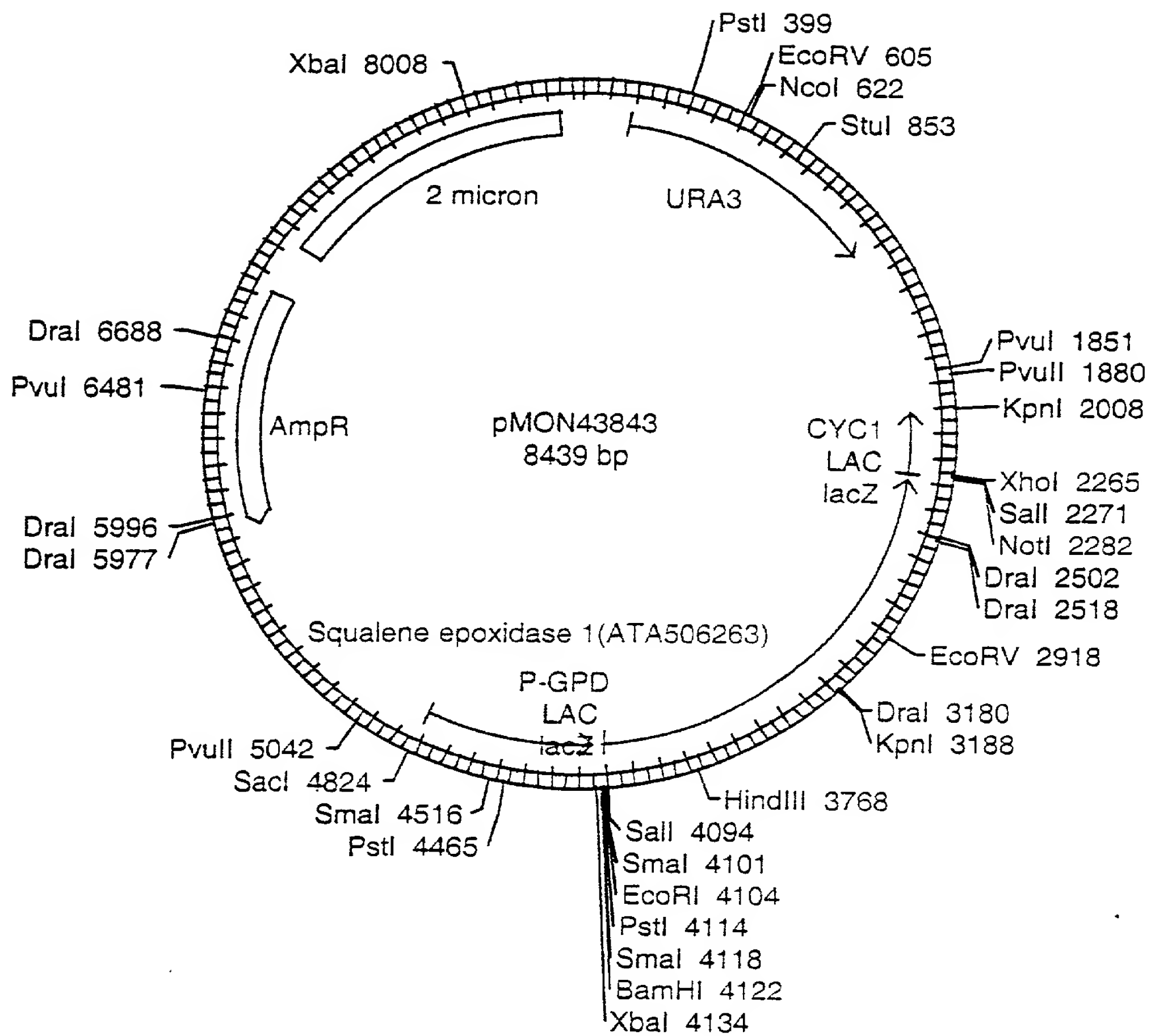


Figure 30: Construct pMON43843

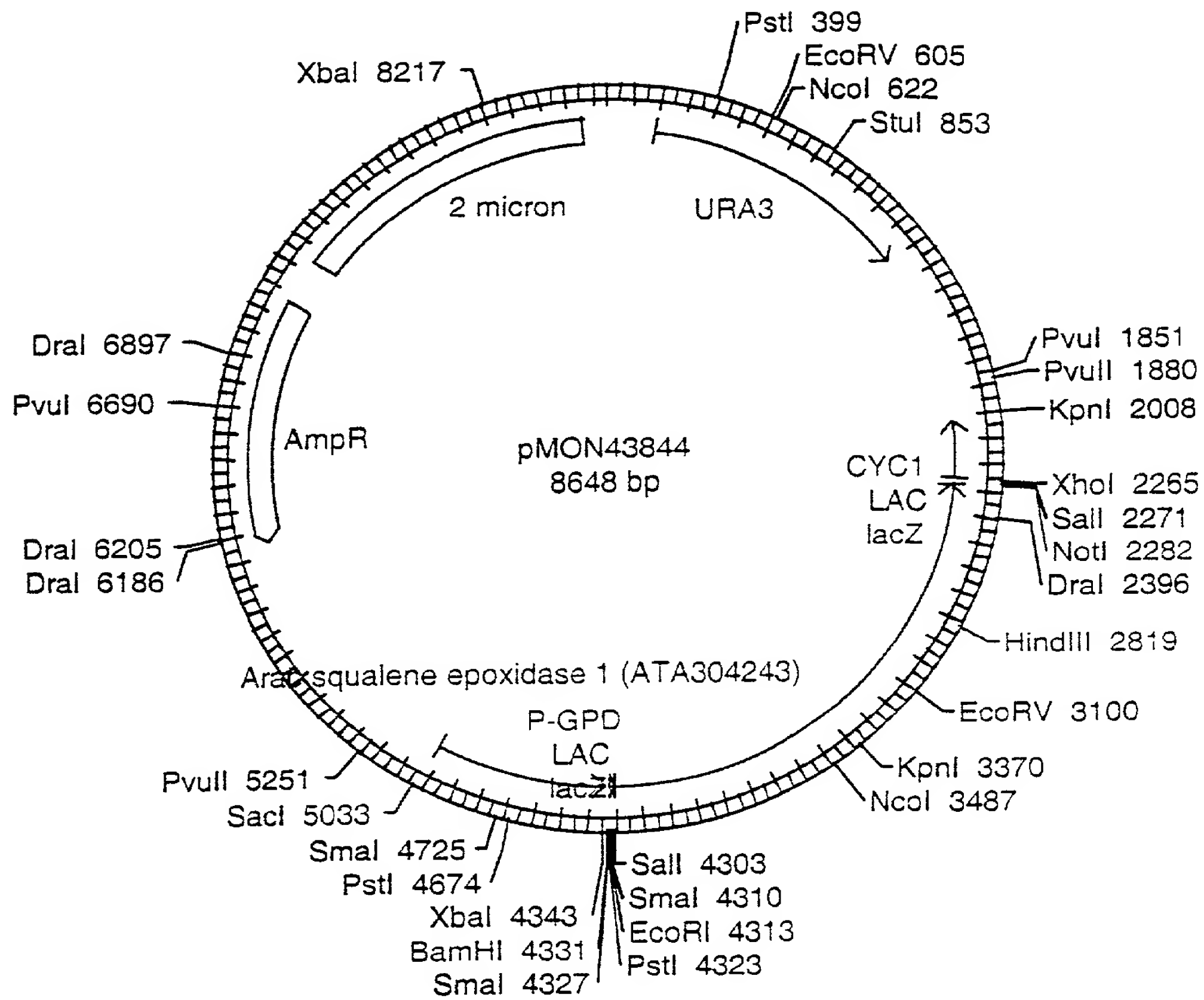


Figure 31: Construct pMON43844

## FIG. 32A

Plurality: 5.00 Threshold: 4 AveWeight 1.00 AveMatch 2.91 AvMismatch -2.00  
1

50  
 HMGRclustalW{methanobac} .....  
 .....  
 HMGRclustalW{methanococ} .....  
 .....  
 HMGRclustalW{halobacter} .....  
 .....  
 HMGRclustalW{sulfolobus} .....  
 .....  
 HMGRclustalW{ yeast2} MSLPLKTIVH LVKPFACAR FSARYPIHVI VVAVLLSAAA  
 YLSVTQSYLN  
 HMGRclustalW{ yeast1} MPPLFKGLKQ MAKPIAYVSR FSAKRPIHII LFSLIISAF  
 YLSVIQYYFN  
 HMGRclustalW{phycomyc} .....  
 .....  
 HMGRclustalW{ fusarium} .....  
 .....  
 HMGRclustalW{ candida} .....  
 .....  
 HMGRclustalW{dictyoste2} .....  
 .....  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} .....  
 .....  
 HMGRclustalW{ corn} .....  
 .....  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} .....  
 .....  
 HMGRclustalW{rosyperiw} .....  
 .....  
 HMGRclustalW{ tomato} .....  
 .....  
 HMGRclustalW{woodtobacc} .....  
 .....  
 HMGRclustalW{ potato} .....  
 .....  
 HMGRclustalW{radish} .....  
 .....  
 HMGRclustalW{arabadops1} .....  
 .....  
 HMGRclustalW{cucumismel} .....  
 .....  
 HMGRclustalW{rubbertre2} .....  
 .....  
 HMGRclustalW{rubbertrel} .....  
 .....  
 HMGRclustalW{camptothec} .....  
 .....  
 HMGRclustalW{arabadops2} .....  
 .....  
 HMGRclustalW{chineseham} .....  
 .....

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FIG. 32B

HMGRclustalW{chineseha2}	.....
.....	
HMGRclustalW{syrianhamst}	.....
.....	
HMGRclustalW{ rat}	.....
.....	
HMGRclustalW{ rabbit}	.....
.....	
HMGRclustalW{ human}	.....
.....	
HMGRclustalW{ mouse}	.....
.....	
HMGRclustalW{ xenopus}	.....
.....	
HMGRclustalW{sea urchin}	.....
.....	
HMGRclustalW{ cockroach}	.....
.....	
HMGRclustalW{drosophila}	.....
.....	
HMGRclustalW{dictyoste1}	.....
.....	
HMGRclustalW{schistosom}	.....
.....	
HMGRclustalW{archaeoglo}	.....
.....	
HMGRclustalW{pseudomonas}	.....
.....	
Consensus	-----
----	

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FIG. 32C

51

```

100
  HMGRclustalW{methanobac} .....
  .....
  HMGRclustalW{methanococ} .....
  .....
  HMGRclustalW{halobacter} .....
  .....
  HMGRclustalW{sulfolobus} .....
  .....
  HMGRclustalW{      yeast2} EWKLDN.QY STYLSIKPDE LFEKCTHYR SPVSDTWKLL
SSKEAADIYT
  HMGRclustalW{      yeast1} GWQLDSNSVF ETAPNKDSNT LFQECSHYR DSSLDGWVSI
TAHEASELPA
  HMGRclustalW{phycomycs} .....
  .....
  HMGRclustalW{  fusarium} .....MDH EGCQGQHPQQ
CCQWVSNAWS
  HMGRclustalW{  candida} .....MFYH GASANQHWIA
VDDLKVPVD
  HMGRclustalW{dictyoste2} .....
  .....
  HMGRclustalW{wheat1} .....
  .....
  HMGRclustalW{      rice} .....
  .....
  HMGRclustalW{  corn} .....
  .....
  HMGRclustalW{wheat3} .....
  .....
  HMGRclustalW{wheat2} .....
  .....
  HMGRclustalW{      soybean} .....
  .....
  HMGRclustalW{rubbertre3} .....
  .....
  HMGRclustalW{rosyperiw} .....
  .....
  HMGRclustalW{      tomato} .....
  .....
  HMGRclustalW{woodtobacc} .....
  .....
  HMGRclustalW{      potato} .....
  .....
  HMGRclustalW{radish} .....
  .....
  HMGRclustalW{arabadopsis1} .....
  .....
  HMGRclustalW{cucumismel} .....
  .....
  HMGRclustalW{rubbertre2} .....
  .....
  HMGRclustalW{rubbertre1} .....
  .....
  HMGRclustalW{camptothec} .....
  .....
  HMGRclustalW{arabadops2} .....
  .....
  HMGRclustalW{chineseham} .....MLSRLFRMH
GLFVASHPWE
  HMGRclustalW{chineseha2} .....MLSRLFRMH

```

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FIG. 32D

GLFVASHPWE			
HMGRclustalW{syrianhamst}	.....		.MLSRLFRMH
GLFVASHPWE			
HMGRclustalW{rat}	.....		.MLSRLFRMH
GLFVASHPWE			
HMGRclustalW{rabbit}	.....		.MLSRLFRMH
GLFVASHPWE			
HMGRclustalW{human}	.....		.MLSRLFRMH
GLFVASHPWE			
HMGRclustalW{mouse}	.....		
.....			
HMGRclustalW{xenopus}	.....		.MLSRLFRMH
GQFVASHPWE			
HMGRclustalW{sea urchin}	.....		.MLSRLFLAQ
GRFCSSHPWE			
HMGRclustalW{cockroach}	.....		.MVGRLFRAH
GQFCASHPWE			
HMGRclustalW{drosophila}	.....		.MIGPLFRAT
.QFCASHPWE			
HMGRclustalW{dictyostel}	.....		
.....			
HMGRclustalW{schistosom}	.....		
.....			
HMGRclustalW{archaeoglo}	.....		
.....			
HMGRclustalW{pseudomonas}	.....		
.....			
	Consensus	-----	-MLSRLFRMH
GLFVASHPWE			

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## FIG. 32E

150		101
HMGRclustalW{methanobac}	.....	.....
.....		
HMGRclustalW{methanococ}	.....	.....
.....		
HMGRclustalW{halobacter}	.....	.....
.....		
HMGRclustalW{sulfolobus}	.....	.....
.....		
HMGRclustalW{ yeast2}	PFHYYLSTIS FQSKDNSTTL PSLDDVIYSV DHTRYLLSEE	
PKIPTELVSE		
HMGRclustalW{ yeast1}	PHHYLLNLN FNSPNETDSI PELANTVFEK DNTKYILQED	
LSVSKEISST		
HMGRclustalW{phycomycs}	.....	.....
.....		
HMGRclustalW{ fusarium}	EFLDLLKNAE TLDIVIMLLG YIAMHLTFVS LFLSMRKMGS	
KFWLGICTLF		
HMGRclustalW{ candida}	VDHYNVVPFQ FRRAGEYKEP VLSGIVELDE VKFVVSQSDA	
AEQWQQLTAE		
HMGRclustalW{dictyoste2}	.....	.....
.....		
HMGRclustalW{wheat1}	.....	.....
.....		
HMGRclustalW{ rice}	.....	.....
.....		
HMGRclustalW{ corn}	.....	.....
.....		
HMGRclustalW{wheat3}	.....	.....
.....		
HMGRclustalW{wheat2}	.....	.....
.....		
HMGRclustalW{ soybean}	.....	.....
.....		
HMGRclustalW{rubbertre3}	.....	.....
.....		
HMGRclustalW{rosyperiwi}	.....	.....
.....		
HMGRclustalW{ tomato}	.....	.....
.....		
HMGRclustalW{woodtobacc}	.....	.....
.....		
HMGRclustalW{ potato}	.....	.....
.....		
HMGRclustalW{radish}	.....	.....
.....		
HMGRclustalW{arabadopsis1}	.....	.....
.....		
HMGRclustalW{cucumismel}	.....	.....
.....		
HMGRclustalW{rubbertre2}	.....	.....
.....		
HMGRclustalW{rubbertrel}	.....	.....
.....		
HMGRclustalW{camptothec}	.....	.....
.....		
HMGRclustalW{arabadops2}	.....	.....
.....		
HMGRclustalW{chineseham}	VIVGTVT..L TICMMSMN.. MFTGNNK...	.....
.....		

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FIG. 32F

HMGRclustalW{chineseha2} VIVGTVT..L TICMMSMN.. MFTGNNK... ..  
 .....  
 HMGRclustalW{syrianhamst} VIVGTVT..L TICMMSMN.. MFTGNNK... ..  
 .....  
 HMGRclustalW{ rat} VIVGTVT..L TICMMSMN.. MFTGNNK... ..  
 .....  
 HMGRclustalW{ rabbit} VIVGTVT..L TICMMSMN.. MFTGNDK... ..  
 .....  
 HMGRclustalW{ human} VIVGTVT..L TICMMSMN.. MFTGNNK... ..  
 .....  
 HMGRclustalW{ mouse} .....  
 .....  
 HMGRclustalW{ xenopus} VIVGTVT..L TICMMSMN.. MFTGNDK... ..  
 .....  
 HMGRclustalW{sea urchin} VIVCTLT..L TICMLSMN.. YFTGLPR... ..  
 .....  
 HMGRclustalW{ cockroach} VIVATLT..L TVCMLTVDQ. RPLGLP.... ..  
 .....  
 HMGRclustalW{drosophila} VIVALLT..I TACMLNGGQE QYPGCEQRIG HSTASAAAAG  
 SGSGAGSGAS  
 HMGRclustalW{dictyostel} .....  
 .....  
 HMGRclustalW{schistosom} .....  
 .....  
 HMGRclustalW{archaeoglo} .....  
 .....  
 HMGRclustalW{pseudomonas} .....  
 .....  
 Consensus VIVGTVT--L TICMMSMN-- MFTGNNK--- -----  
 ----

FIG. 32G

200	151
HMGRclustalW{methanobac}	.....
.....	.....
HMGRclustalW{methanococ}	.....
.....	.....
HMGRclustalW{halobacter}	.....
.....	.....
HMGRclustalW{sulfolobus}	.....
.....	.....
HMGRclustalW{ yeast2}	NGTKWRLRNN SNFILDLENI YRNMVKQFSN KTSEFDQFDL
FIILAAYLTL	
HMGRclustalW{ yeast1}	DGTKWRLRSD RKSLFDVKTL AYSLYDVFSE NVTQADPFDV
LIMVTAYLMM	
HMGRclustalW{phycomyces}	.....
.....	.....
HMGRclustalW{ fusarium}	SSVFAFLFGL VVTTKLGVP I SVILLSEGLP FLVVTIGFEK
NIVLTRA VMS	
HMGRclustalW{ candida}	DGTWVRSRAY HGKLGKYS DM AVGAFNKVLN LVRGAETFDI
ALVTCAYIAM	
HMGRclustalW{dictyoste2}	.....
.....	.....
HMGRclustalW{wheat1}	.....
.....	.....
HMGRclustalW{ rice}	.....
.....	.....
HMGRclustalW{ corn}	.....
.....	.....
HMGRclustalW{wheat3}	.....
.....	.....
HMGRclustalW{wheat2}	.....
.....	.....
HMGRclustalW{ soybean}	.....
.....	.....
HMGRclustalW{rubbertre3}	.....
.....	.....
HMGRclustalW{rosyperiwi}	.....
.....	.....
HMGRclustalW{ tomato}	.....
.....	.....
HMGRclustalW{woodtobacc}	.....
.....	.....
HMGRclustalW{ potato}	.....
.....	.....
HMGRclustalW{radish}	.....
.....	.....
HMGRclustalW{arabadopsis1}	.....
.....	.....
HMGRclustalW{cucumismel}	.....
.....	.....
HMGRclustalW{rubbertre2}	.....
.....	.....
HMGRclustalW{rubbertrel}	.....
.....	.....
HMGRclustalW{camptothec}	.....
.....	.....
HMGRclustalW{arabadops2}	.....
.....	.....
HMGRclustalW{chineseham}	.....I CGWNYEC.PK FEEDVLSSDI
IILTITRCIA	

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```

      HMGRclustalW{chineseha2} .....I CGWNYEC.PK FEEDVLSSDI
IILTITRCIA
      HMGRclustalW{syrianhamst} .....I CGWNYEC.PK FEEDVLSSDI
IILTITRCIA
      HMGRclustalW{      rat} .....I CGWNYEC.PK FEEDVLSSDI
IILTITRCIA
      HMGRclustalW{      rabbit} .....I CGWNYEC.PK FEEDVLSSDI
IILTITRCIA
      HMGRclustalW{      human} .....I CGWNYEC.PK FEEDVLSSDI
IILTITRCIA
      HMGRclustalW{      mouse} .....
.....
      HMGRclustalW{      xenopus} .....I CGWNYAC.PK FEEDVLSSDI
IILTITRCIA
      HMGRclustalW{sea urchin} .....I CGWNYECAPQ VKESSLSSDV
LVMCIMRTLA
      HMGRclustalW{cockroach} ..... PGWGHNC..I TLEEYNAADM
IVMTLIRCVA
      HMGRclustalW{drosophila} GTIPPSSMGG SATSSRHRPC HGWSQSC.DG LEAEYNAADV
ILMTIVRCTA
      HMGRclustalW{dictyostel} .....
.....
      HMGRclustalW{schistosom} .....M LKILNTVLLF FDCFSTGTFF
VLLIYLFTRL
      HMGRclustalW{archaeoglo} .....
.....
      HMGRclustalW{pseudomonas} .....
.....
      Consensus -----I CGWNYEC-PK FEEDVLSSDI
IILTITRCIA

```

## FIG. 32I

250		201
HMGRclustalW{methanobac}	.....	.....
.....		
HMGRclustalW{methanococ}	.....	.....
.....		
HMGRclustalW{halobacter}	.....	.....
.....		
HMGRclustalW{sulfolobus}	.....	.....
.....		
HMGRclustalW{ yeast2}	FYTLCCLFND MRKIGSKFWL SFSALSNSAC ALYLSLYTTH	
SLLKKPASLL		
HMGRclustalW{ yeast1}	FYTIFGLFND MRKTGSNFWL SASTVVNSAS SLFLALYVTQ	
CILGKEVSAL		
HMGRclustalW{phycomyces}	.....	.....
.....		
HMGRclustalW{ fusarium}	HAIEHRRIQ A QNSKSGKRSP DGSTQNMIQY AVQA AIKEKG	
FEIIRDYAIE		
HMGRclustalW{ candida}	FYTILFNLFAR MRAVGSKVWL GLSTLVSSFF AFLFALYITT	
RVLDLSIPFL		
HMGRclustalW{dictyoste2}	.....	.....
.....		
HMGRclustalW{wheat1}	.....	.....
.....		
HMGRclustalW{ rice}	.....	.....
.....		
HMGRclustalW{ corn}	.....	.....
.....		
HMGRclustalW{wheat3}	.....	.....
.....		
HMGRclustalW{wheat2}	.....	.....
.....		
HMGRclustalW{ soybean}	.....	.....
.....		
HMGRclustalW{rubbertre3}	.....	.....
.....		
HMGRclustalW{rosyperiwi}	.....	.....
.....		
HMGRclustalW{ tomato}	.....	.....
.....		
HMGRclustalW{woodtobacc}	.....	.....
.....		
HMGRclustalW{ potato}	.....	.....
.....		
HMGRclustalW{radish}	.....	.....
.....		
HMGRclustalW{arabadosis1}	.....	.....
.....		
HMGRclustalW{cucumismel}	.....	.....
.....		
HMGRclustalW{rubbertre2}	.....	.....
.....		
HMGRclustalW{rubbertrel}	.....	.....
.....		
HMGRclustalW{camptothec}	.....	.....
.....		
HMGRclustalW{arabados2}	.....	.....
.....		
HMGRclustalW{chineseham}	ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH	
.....		

09885723-123404



FIG. 32J

```

HMGRclustalW{chineseha2}  ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....
HMGRclustalW{syrianhamst}  ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....
HMGRclustalW{      rat}    ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....
HMGRclustalW{      rabbit}  ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....
HMGRclustalW{      human}   ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....
HMGRclustalW{      mouse}   .....
.....
HMGRclustalW{      xenopus}  ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....
HMGRclustalW{sea urchin}    VAYLYLQFTK LRTTGSKYIL GIAGLFTIFS SFLFSSAVIH
.....
HMGRclustalW{cockroach}     VLYSYYQFCH LQKLGSKYIL GIAGLFTVFS SFVFSSSVIN
.....
HMGRclustalW{drosophila}     VLYCYYQFCS LHRLGSKYVL GIAGLFTVFS SFIFTTALIK
.....
HMGRclustalW{dictyostel}     .....
.....
HMGRclustalW{schistosom}     RTHLLHFSSS NCHLDVIIYQ SRAVIIFLVV FVYFIGVLTC
KINDKILVHT
HMGRclustalW{archaeoglo}     .....
.....
HMGRclustalW{pseudomonas}    .....
.....

Consensus  ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH -----
-----

```

## FIG. 32K

300	251
HMGRclustalW{methanobac}	.....
.....	
HMGRclustalW{methanococ}	.....
.....	
HMGRclustalW{halobacter}	.....
.....	
HMGRclustalW{sulfolobus}	.....
.....	
HMGRclustalW{ yeast2}	SLVIGLPFIV VIIG.FKHKV RLAAFSLOKF HRISIDKKIT
VSNIIYEAMF	
HMGRclustalW{ yeast1}	TLFEGLPFIV VVVG.FKHKI KIAQYALEKF ERVGLSKRIT
TDEIVFESVS	
HMGRclustalW{phycomyces}	.....
.....	
HMGRclustalW{ fusarium}	IVILVIGAAS GVQGGLQQFC FLAAWTLF.F DFILLFTFYT
AILSILKLRST	
HMGRclustalW{ candida}	SLSEGIPFFV AVVG.FNNKI LLAEKVLQ.N QLNAQSSKND
APTVLYQALR	
HMGRclustalW{dictyoste2}	.....
.....	
HMGRclustalW{wheat1}	.....
.....	
HMGRclustalW{ rice}	.....
.....	
HMGRclustalW{ corn}	.....M EVRG..... .GVGQGSAAAR
.....HPPA	
HMGRclustalW{wheat3}	.....
.....	
HMGRclustalW{wheat2}	.....
.....	
HMGRclustalW{ soybean}	.....
.....	
HMGRclustalW{rubbertre3}	.....M DEVRRRPP.K HIVRKDHDGE
VLNSFSHG..	
HMGRclustalW{rosyperiw}	.....M DSRRRSP... TVTAKAAAGE
LPLAPHEGQ.	
HMGRclustalW{ tomato}	.....M DVRRRSEEPV YPSKVFAADE
KPLKPHKKQQ	
HMGRclustalW{woodtobacc}	.....M DVRRRSEKPA YPTKEFAAGE
KPLKPHK...	
HMGRclustalW{ potato}	.....M DVRRRPVKPL YTSKDASAG.
EPLKQQE...	
HMGRclustalW{radish}	.....M DIRR..RPPK PPVNSN....
...RFLDNRS	
HMGRclustalW{arabadosis1}	.....M DLRR..RPPK PPVTNNNNNSN
GSFRSYQPRT	
HMGRclustalW{cucumismel}	.....M DRRRSLRPPR PNAVQDADAT
CTFRRDEQDA	
HMGRclustalW{rubbertre2}	.....
.....	
HMGRclustalW{rubbertrel}	.....M DTTG..RLH. ....HR....
.....KHAT	
HMGRclustalW{camptothec}	.....M DVRRRSINSI HQIPSVGGTA
PPMLKPKQPT	
HMGRclustalW{arabados2}	.....M EDLRRRFPTK KNGEEISN..
.....	
HMGRclustalW{chineseham}	FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE
VRENIARGMA	

## FIG. 32L

HMGRclustalW{chineseha2} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE  
 VRENIARGMA  
 HMGRclustalW{syrianhamst} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE  
 VRENIARGMA  
 HMGRclustalW{ rat} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE  
 VRENIARGMA  
 HMGRclustalW{ rabbit} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE  
 VRENIARGMA  
 HMGRclustalW{ human} FLDKELTGLN EALPFFLLLI DLSRASTLAK FALSSNSQDE  
 VRENIARGMA  
 HMGRclustalW{ mouse} .....  
 .....  
 HMGRclustalW{ xenopus} FLDKELTGLN EALPFFLLLI DLSKASALAK FALSSNSQDE  
 VRDNIARGMA  
 HMGRclustalW{sea urchin} LFGLELTGLN EALPFFLLLI DLTkasaltk FALSSTTQNE  
 VVDNIARGMA  
 HMGRclustalW{ cockroach} FLGSDVSDLK DALFFFLLLI DLSKATVLAQ FALSSRSQDE  
 VKHNIARGIA  
 HMGRclustalW{drosophila} FLGSDISELK DALFFLLLVI DLSNSGRLRS GAMGSN.QAE  
 VTQNIARGLE  
 HMGRclustalW{dictyostel} .....  
 .....  
 HMGRclustalW{schistosom} MLRNKRQLNT LFYTLILFTF ALCSLSSVLF VPYTSFAIFL  
 LSTSVFLLFS  
 HMGRclustalW{archaeoglo} .....  
 .....  
 HMGRclustalW{pseudomonas} .....  
 .....  
 Consensus FLDKELTGLN EALPFFLLL- DL-RASALAK FALSSNSQDE  
 VRENIARGMA

FIG. 32M

```

350
  HMGRclustalW{methanobac} .....
  .....
  HMGRclustalW{methanococ} .....
  .....
  HMGRclustalW{halobacter} .....
  .....
  HMGRclustalW{sulfolobus} .....
  .....
  HMGRclustalW{      yeast2} QEGAYLIRDY LFYISSFIGC AIYARHLPGL VNFCILSTFM
LVFDLLLSAT
  HMGRclustalW{      yeast1} EEGGRLIQDH LLCIFAFIGC SMYAHQLKTL TNFCILSAFI
LIFELILTPT
  HMGRclustalW{phycomyces} .....
  .....
  HMGRclustalW{  fusarium} VSSVMSICVW PLRMMASRRV AENVAKGDDE LNRVRGDAPL
FGRKSSSIPK
  HMGRclustalW{  candida} EQGPLLLLRDH LFMITAFLGC SFYASYLDGL KNFCILAALI
LAFDILTST
  HMGRclustalW{dictyoste2} .....
  .....
    HMGRclustalW{wheat1} .....
  .....
  HMGRclustalW{      rice} ..... .MRIT.....
...NGLAMVS
    HMGRclustalW{  corn} PE....PSRA .....AA RVQAGDALPL PIRHT.....
...NLIFSAL
    HMGRclustalW{wheat3} .....
  .....
    HMGRclustalW{wheat2} .....
  .....
HMGRclustalW{      soybean} .....
  .....
  HMGRclustalW{rubbertre3} .....HH L.....PP LKPSDYSLPL SLYLA.....
...NALVFSL
  HMGRclustalW{rosyperiwi} .....NQ Q.....PS IPRSSDVLPL PLYLA.....
...NGVFFTL
  HMGRclustalW{      tomato} QQ....QEDK N.....TL LIDASDALPL PLYLTT....
...NGLFFTM
  HMGRclustalW{woodtobacc} QQ....QEQD N.....SL LI.ASDALPL PLYLT.....
...NGLFFTM
  HMGRclustalW{      potato} .....VS SPKASDALPL PLYLT.....
...NGLFFTM
    HMGRclustalW{radish} DD....DDRR K.....TLTS PPKASDALPL PLYLT.....
...NAVFFTL
HMGRclustalW{arabadosis1} SD....DDHR RR..ATTIAP PPKASDALPL PLYLT.....
...NAVFFTL
  HMGRclustalW{cucumismel} SA....ADHL KR.....A SPKASDALPL PLYLT.....
...NTIFFTL
  HMGRclustalW{rubbertre2} .....
  .....
  HMGRclustalW{rubbertre1} PV....EDRS P.....T TPKASDALPL PLYLT.....
...NAVFFTL
  HMGRclustalW{camptothec} KV....DAVD L.....PD SPKASDALPL PLYIT.....
...NGVFFTL
  HMGRclustalW{arabados2} .....VAVD .....PP LRKASDALPL PLYLT.....
...NTFFLSL
  HMGRclustalW{chineseham} ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFVFMT

```

FIG. 32N

```

      HMGRclustalW{chineseha2}  ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFVFMT
      HMGRclustalW{syrianhamst}  ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFVFMT
      HMGRclustalW{      rat}    ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFVFMT
      HMGRclustalW{      rabbit}  ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFVFMT
      HMGRclustalW{      human}   ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFVFMT
      HMGRclustalW{      mouse}   .....
.....
      HMGRclustalW{      xenopus}  ILGPTFTLEA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFAFMT
      HMGRclustalW{sea urchin}    ILGPTITLDT VV..TTLVIS IGTSSIRKM EVFCCFGILS
LIANYFVFMT
      HMGRclustalW{cockroach}     MLGPTITLDT VV..ETLVIG VGMLSGVRRL EVLCCFACMS
VIVNYVVFMT
      HMGRclustalW{drosophila}    LLGPAISLDT IV..VLLVIG VGTLSGVQRL EVLCMFAVLS
VLVNYVVFMT
      HMGRclustalW{dictyostel}    .....M LFAPPNLETK ELFWIYY.IL
ILIPKVFAKV
      HMGRclustalW{schistosom}    DLSVFFIVLE YLLEIELVN YEHAKRHCLL SHLFSNQLFV
DHMLGMLFKT
      HMGRclustalW{archaeoglo}    .....
.....
      HMGRclustalW{pseudomonas}   .....
.....

Consensus  ILGPTFTLDA LV--ECLVIG VGTASD-LPL -LYCTFGCMS
VLANYFFFMT

```

FIG. 320

400	351				
HMGRclustalW{methanobac}	.....	.....	.....	.....	.....
.....					
HMGRclustalW{methanococ}	.....	.....	.....	.....	.....
.....					
HMGRclustalW{halobacter}	.....	.....	.....	.....	.....
.....					
HMGRclustalW{sulfolobus}	.....	.....	.....	.....	.....
.....					
HMGRclustalW{ yeast2}	FYSAILSMKL	EINIIHRSTV	IRQTL..EED	GVVPTTADII	
YKDETASEPH					
HMGRclustalW{ yeast1}	FYSAILALRL	EMNVIHRSTI	IKQTL..EED	GVVPSTARI	
SKAEKKS SVSS					
HMGRclustalW{phycomyces}	.....	.....	.....	.....	.....
.....					
HMGRclustalW{ fusarium}	FKVLMILGFI	FVNIVNICSI	PFRNP..SSM	STIRTWASSL	
GGVIAPLSVD					
HMGRclustalW{ candida}	FLSAILSLKL	EINQIHRSTL	LREQL..EDD	GLTETTVDV	
LKSNSLAGTK					
HMGRclustalW{dictyoste2}	.....	.....	.....	.....	.....
.....					
HMGRclustalW{wheat1}	.....	.....	.....	.....	.....
.....					
HMGRclustalW{ rice}	LVLSSCDLVR	LCSDRER...	PL.....	....GGREFA	
TVVCQLASVV					
HMGRclustalW{ corn}	FAASLAYLMR	RWREKIRSST	PLHA.....	...VGLAEML	
AIFGLVASLI					
HMGRclustalW{wheat3}	.....	.....	.....	.....	.....
.....					
HMGRclustalW{wheat2}	.....	.....	.....	.....	.....
.....					
HMGRclustalW{ soybean}	.....	.....	.....	.....	.....
.....					
HMGRclustalW{rubbertre3}	FFSVAYFLLH	RWREKIRKST	PLHI.....	...VTFPEIA	
ALICLVASVI					
HMGRclustalW{rosyperiwi}	FFSVMYFLLT	RWREKIRNAT	PLHV.....	...VTLSEIA	
ALASLIASVI					
HMGRclustalW{ tomato}	FFSVMYFLLS	RWREKIRNST	PLHV.....	...VTLSELG	
AIVSLIASVI					
HMGRclustalW{woodtobacc}	FFSVMYYLLS	RWREKIRNST	PLHV.....	...VTFSELV	
AIASLIASVI					
HMGRclustalW{ potato}	FFSVMYFLLV	RWREKIRNSI	PLHV.....	...VTLSELL	
AMVSLIASVI					
HMGRclustalW{radish}	FFSVAYYLLH	RWRDKIRYNT	PLHV.....	...VTVTELG	
AIVALIASFI					
HMGRclustalW{arabadosis1}	FFSVAYYLLH	RWRDKIRYNT	PLHV.....	...VTITELG	
AIIALIASFI					
HMGRclustalW{cucumismel}	FFSVAYYLLH	RWRDKIRNST	PLHV.....	...VTLSEIA	
AIVSLMASFI					
HMGRclustalW{rubbertre2}	.....	.....	.....	.....	.....
.....					
HMGRclustalW{rubbertrel}	FFSVAYYLLH	RWRDKIRNST	PLHI.....	...VTLSEIV	
AIVSLIASFI					
HMGRclustalW{camptothec}	FFTVVYLLV	RWREKIRNST	PLHV.....	...VTLSEIA	
AIFTFVASFI					
HMGRclustalW{arabados2}	FFATVYFLLS	RWREKIRNST	PLHV.....	...VDLSEIC	
ALIGFVASFI					
HMGRclustalW{chineseham}	FFPACVSLVL	ELSRESREGR	PIWQ...LSH	FARVLEEEE.	
NKPNPVTQRV					



## FIG. 32P

HMGRclustalW{chineseha2} FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.  
 NKPNPVTQRV  
 HMGRclustalW{syrianhamst} FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.  
 NKPNPVTQRV  
 HMGRclustalW{ rat} FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.  
 NKPNPVTQRV  
 HMGRclustalW{ rabbit} FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.  
 NKPNPVTQRV  
 HMGRclustalW{ human} FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.  
 NKPNPVTQRV  
 HMGRclustalW{ mouse} .....  
 .....  
 HMGRclustalW{ xenopus} FFPACVSLVL ELSRESREGR PIWQ...LSQ FASVLEEEED  
 NKPNPVTQRV  
 HMGRclustalW{sea urchin} FFPACLSLVL ELSNSNKYGR PVWH...LGR FAEVLEEEED  
 RKPNPVVQRV  
 HMGRclustalW{ cockroach} FYPACLSLIL ELSRSGESGR PAWHD..KSL IIKALHEED.  
 QKPNPVVQRV  
 HMGRclustalW{drosophila} FYPACLSLIF DLSRSGVDMS VVREKAKGSL PLKSLTEEE.  
 QKANPVLQRV  
 HMGRclustalW{dictyostel} MSVRELFPPF KWGFNIRRSN FLVP..... ...ILSNNVI  
 VTGEEAVQYE  
 HMGRclustalW{schistosom} SLFSISTTSK YAYLESIFKC TLMEQIIYIM IVFVFLPSFM  
 RIFASYAKRM  
 HMGRclustalW{archaeoglo} .....  
 .....  
 HMGRclustalW{pseudomonas} .....  
 .....  
 Consensus FFSACYSLLL -WRRKIRNST PLHV---LSH FARVTLEEEA AKPN-  
 VASRI

FIG. 32Q

450		401
HMGRclustalW{methanobac}	.....	.....
.....		
HMGRclustalW{methanococ}	.....	.....
.....		
HMGRclustalW{halobacter}	.....	.....
.....		
HMGRclustalW{sulfolobus}	.....	.....
.....		
HMGRclustalW{ yeast2}	FLRSNVAIIL GKASVIGLLL LINLYVF... .TDKLNATIL	
NTVYFDSTIY		
HMGRclustalW{ yeast1}	FLNLSVVVII MKLSVILLFV FINFYNF... GANWVN.DAF	
NSLYFDKERV		
HMGRclustalW{phycomyces}	.....	.....
.....		
HMGRclustalW{ fusarium}	PFKVASNGLD AILPTAKSNN RPTLVTV... LTPIKYELEY	
PSIHYALGSA		
HMGRclustalW{ candida}	TFTDAPSTLV TVAKVAGVSV FFGLHFY... GFSAWLSDL	
SAGNETNDF		
HMGRclustalW{dictyoste2}	.....	.....
.....		
HMGRclustalW{wheat1}	.....	.....
.....		
HMGRclustalW{ rice}	YLLSLFAHPD APATTGDDD .....	.....
.....		
HMGRclustalW{ corn}	YLLSFFGIAF VQSIVSSGDD .....	.....
.....		
HMGRclustalW{wheat3}	.....	.....
.....		
HMGRclustalW{wheat2}	.....	.....
.....		
HMGRclustalW{ soybean}	.....	.....
.....		
HMGRclustalW{rubbertre3}	YLLGFFGIGF VHSFS.RAST .....	.....
.....		
HMGRclustalW{rosyperiwi}	YLVSFFGLDF VQSLIYKPNN .....	.....
.....		
HMGRclustalW{ tomato}	YLLGFFGIGF VQTFVSRGNN .....	.....
.....		
HMGRclustalW{woodtobacc}	YLLGFFGIGF VQSFVSRDNN .....	.....
.....		
HMGRclustalW{ potato}	YLLGFFGIGF VQSFVSRSNS .....	.....
.....		
HMGRclustalW{radish}	YLLGFFGIDF VQSFISRP.. .....	.....
.....		
HMGRclustalW{arabadopsis1}	YLLGFFGIDF VQSFISRASG .....	.....
.....		
HMGRclustalW{cucumismel}	YLLGFFGIDF VQSFARSSP .....	.....
.....		
HMGRclustalW{rubbertre2}	.....	.....
.....		
HMGRclustalW{rubbertrel}	YLLGFFGIDF VQSFARASH .....	.....
.....		
HMGRclustalW{camptothec}	YLLGFFGIGL VQPFTSRSSH .....	.....
.....		
HMGRclustalW{arabadops2}	YLLGFCGIDL IFRSS..SD. ....	.....
.....		
HMGRclustalW{chineseham}	KMIMSLGLVL VHAHSRWIAD PSPQNST... TE.HSKVSLG	
LDEDVSKRIE		

49/78

FIG. 32R

HMGRclustalW{chineseha2}	KMIMSLGLVL VHAHSRWIAD PSPQNST... TE.HSKVSLG
LDEDVSKRIE	
HMGRclustalW{syrianhamst}	KMIMSLGLVL VHAHSRWIAD PSPQNST... TE.HSKVSLG
LDEDVSKRIE	
HMGRclustalW{ rat}	KMIMSLGLVL VHAHSRWIAD PSPQNST... AE.QSKVSLG
LAEDVSKRIE	
HMGRclustalW{ rabbit}	KMIMSLGLVL VHAHSRWIAD PSPQNST... AD.NSKVSLG
LDENVSKRIE	
HMGRclustalW{ human}	KMIMSLGLVL VHAHSRWIAD PSPQNST... AD.TSKVSLG
LDENVSKRIE	
HMGRclustalW{ mouse}	.....
.....	
HMGRclustalW{ xenopus}	KMIMSLGLVL VHAHSRWIAD PSSQNST... SISDHEVTTM
LDDMMPKRVE	
HMGRclustalW{sea urchin}	KMIMRTGLVL VHAHSRWLAS ....NDT... ELMSRDMLYD
GNLLTDKKID	
HMGRclustalW{ cockroach}	KVIMSAGLML VHAH.RWVRC .....L.
.....	
HMGRclustalW{drosophila}	KLIMTTGLMA VHIYSREVSP ....AAT... TMVDKTLTPT
LSLNVSNRT	
HMGRclustalW{dictyostel}	KPLPYIPQHN QQQQQKQQPS .....L.
.....	
HMGRclustalW{schistosom}	YGEQKKCLVS NKGVSSTRK RRHSYSSGHS YVEYRRMSVH
NLIGYVVNPN	
HMGRclustalW{archaeoglo}	.....
.....	
HMGRclustalW{pseudomonas}	.....
.....	
Consensus	YLL-FFG-VL V-A-SR-ISD PSPQNST--- ----SKVSLG LDE-
VSKRIE	

0985723-423404

## FIG. 32S

500	451
HMGRclustalW{methanobac}	.....
.....	.....
HMGRclustalW{methanococ}	.....
.....	.....
HMGRclustalW{halobacter}	.....
.....	.....
HMGRclustalW{sulfolobus}	.....
.....	.....
HMGRclustalW{ yeast2}	SLPNFINYKD IGNLSNQVII SVLPKQYYTP LKKYHQIEDS
VLLIIDSVS	
HMGRclustalW{ yeast1}	SLPDFITSNA SENFKEQAIV SVTPLLYYKP IKSYQRIEDM
VLLLLLRNVSV	
HMGRclustalW{phycomyces}	.....
.....	.....
HMGRclustalW{ fusarium}	ASNPAYN.DA FHHHFQGYGV GGRMVGGILK SLEDPVLSKW
IVIALALSVA	
HMGRclustalW{ candida}	TLYDAVA.DQ IPIGSNGTLV TLFPTRFPLP EKLSTQIEAV
VLSFIGLIST	
HMGRclustalW{dictyoste2}	.....
.....	.....
HMGRclustalW{wheat1}	.....
.....	.....
HMGRclustalW{ rice}	..D.....
.....	.....
HMGRclustalW{ corn}	..DEDFLVGS G.....
.....	.....
HMGRclustalW{wheat3}	.....
.....	.....
HMGRclustalW{wheat2}	.....
.....	.....
HMGRclustalW{ soybean}	.....
.....	.....
HMGRclustalW{rubbertre3}	..D.SWDVEE Y.....D DDNIIIKEDT
R.....	
HMGRclustalW{rosyperiwi}	..E.GWEIEE .....EILMVEDS
RN.....	
HMGRclustalW{ tomato}	..D.SWDE... ..N DEEFLLKEDS
RC.....	
HMGRclustalW{woodtobacc}	..DECWDEED E.....N DEQFLLEEDS
RR.....	
HMGRclustalW{ potato}	..D.SWDIED E.....N AEQLIIEEDS
RR.....	
HMGRclustalW{radish}	..D.SGDSER .....DFDDH
R.....	
HMGRclustalW{arabadopsis1}	..D.AWDLAD T.....I .....DDDDH
R.....	
HMGRclustalW{cucumismel}	..D.AWDLED .....EIDRT
L.....	
HMGRclustalW{rubbertre2}	.....
.....	.....
HMGRclustalW{rubbertrel}	..D.VWDLED T.....D P.NYLIDEDH
R.....	
HMGRclustalW{camptothec}	..DDVWGVDD DE.....D VDEIVLKEDT
R.....	
HMGRclustalW{arabadops2}	..DDVWVNDG .....D
.....	.....
HMGRclustalW{chineseham}	PSVSLWQFYL SKMISMDIEQ VVTLSLAFLL AVKYIFFEQA
ET..ESTLSL	

FIG. 32T

HMGRclustalW{chinese2} PSVSLWQFYL SKMISMDIEQ VVTLSLAFL L AVKYIFFEQA  
 ET..ESTLSL  
 HMGRclustalW{syrianhamst} PSVSLWQFYL SKMISMDIEQ VVTLSLAFL L AVKYIFFEQA  
 ET..ESTLSL  
 HMGRclustalW{ rat} PSVSLWQFYL SKMISMDIEQ VITLSLALL L AVKYIFFEQA  
 ET..ESTLSL  
 HMGRclustalW{ rabbit} PSVSLWQFYL SKMISMDIEQ VITLSLALL L AVKYIFFEQA  
 ET..ESTLSL  
 HMGRclustalW{ human} PSVSLWQFYL SKMISMDIEQ VITLSLALL L AVKYIFFEQT  
 ET..ESTLSL  
 HMGRclustalW{ mouse} .....  
 .....  
 HMGRclustalW{ xenopus} PSMPLWQFYL SRMVTMDVEQ IITLGLALL L AVKYIFFEQT  
 ET..ESTFSM  
 HMGRclustalW{sea urchin} PTMPLWEFYA TRLWPPTLDY ILTAILATVL ASHYIFFSDL  
 ATYPEKRVSI  
 HMGRclustalW{ cockroach} .SIALWPDLT S.....LRY FCTHCDTGVS YSRWSFASEG  
 EE..LPTVKL  
 HMGRclustalW{drosophila} ESGEIADIII KWL.TMSADH IVISIVLIAL VVKFICFDNR  
 DP...LPDQL  
 HMGRclustalW{dictyostel} ..QDYIQQPQ ..... ..N....DNN  
 IN.....  
 HMGRclustalW{schistosom} CHYKCWSTTF VIFVSLIILH LNNRYSERIS SFKHNSSENE  
 VFPVLYHITA  
 HMGRclustalW{archaeoglo} .....  
 .....  
 HMGRclustalW{pseudomonas} .....  
 .....  
 Consensus PSDSLWDFY- SKMISMDIEQ VVTLSLA-LL AVKYIFFED- RT--  
 ESTLSL



## FIG. 32U

550

HMGRclustalW{methanobac} .....  
 .....  
 HMGRclustalW{methanococ} .....  
 .....  
 HMGRclustalW{halobacter} .....  
 .....  
 HMGRclustalW{sulfolobus} .....  
 .....  
 HMGRclustalW{ yeast2} AIRDQFISKL LFFAFAVSIS INVYLLNAAK IHTGYMNFQ.  
 ..PQSNKIDD  
 HMGRclustalW{ yeast1} AIRDRFVSKL VLSALVCSAV INVYLLNAAR IHTSYTADQL  
 VKTEVTKKSF  
 HMGRclustalW{phycomyces} .....  
 .....  
 HMGRclustalW{ fusarium} LNGYLFNVAR WGIKDPNVPE HNIDRNELAR AREFNDTGS.  
 .....AT  
 HMGRclustalW{ candida} AARDKYISKF ILFAFAVSAS INVYLLNVAR IHTTRLEDA.  
 .....IE  
 HMGRclustalW{dictyoste2} .....  
 .....  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} .....  
 .....  
 HMGRclustalW{ corn} .....  
 .....  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} .....  
 .....  
 HMGRclustalW{rosyperiw} .....G.....  
 .....  
 HMGRclustalW{ tomato} .....G.....  
 .....  
 HMGRclustalW{woodtobacc} .....G.....  
 .....  
 HMGRclustalW{ potato} .....G.....  
 .....  
 HMGRclustalW{radish} .....  
 .....  
 HMGRclustalW{arabadopsis1} .....  
 .....  
 HMGRclustalW{cucumismel} .....  
 .....  
 HMGRclustalW{rubbertre2} .....  
 .....  
 HMGRclustalW{rubbertre1} .....  
 .....  
 HMGRclustalW{camptothec} .....  
 .....  
 HMGRclustalW{arabadops2} .....  
 .....  
 HMGRclustalW{chineseham} KN..PITSPV VTPKKAPDNC CRREPLLVR R SEKLSSVEEE  
 PGVSQDRKVE

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FIG. 32V

HMGRclustalW{chineseha2} KN..PITSPV VTPKKAPDNC CRREPLLVRN SEKLSSVEEE  
 PGVSQDRKVE  
 HMGRclustalW{syrianhamst} KN..PITSPV ATPKKAPDNC CRREPVLRR NEKLSSVEEE  
 PGVNQDRKVE  
 HMGRclustalW{ rat} KN..PITSPV VTPKKAQDNC CRREPLLVRN NQKLSSVEED  
 PGVNQDRKVE  
 HMGRclustalW{ rabbit} KN..PITSPV VTQKKVPDSC CRREPVVVRN NQKFCSVEEE  
 AGMSQDRKVE  
 HMGRclustalW{ human} KN..PITSPV VTQKKVPDNC CRREPMLVRN NQKCDSEVEE  
 TGINRERKVE  
 HMGRclustalW{ mouse} .....  
 .....  
 HMGRclustalW{ xenopus} KN..PIISPV AVQKKQIESC CRREPEQ.EK TVHVSTTEEA  
 S..SKEETEA  
 HMGRclustalW{sea urchin} MEGHEVVNPG SDHEDASEVE TIGTLSSSPS TSDVRVIESM  
 TSRTQACQTD  
 HMGRclustalW{ cockroach} VTGDSVVNSN STDDAQLHYY IMRWLTV..S ADHIVILILL  
 LALAVKFVFF  
 HMGRclustalW{drosophila} RQ....SGPV AIEAKASQTT PIDEEHVE.. .....QEKD  
 TENSAAVRTL  
 HMGRclustalW{dictyostel} .....  
 .....  
 HMGRclustalW{schistosom} YEVTSIFHFI YNIFHVINAN LVVYLFLGLF LFKRIRLNKP  
 INSQLRNLNI  
 HMGRclustalW{archaeoglo} .....  
 .....  
 HMGRclustalW{pseudomonas} .....  
 .....  
 Consensus KN--PITSPV VT-KKAPDNC CRREPLLVRN --K-SSVEEE -G-  
 SQDRKVE

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## FIG. 32W

600	551	
HMGRclustalW{methanobac}	.....	.....
.....		
HMGRclustalW{methanococ}	.....	.....
.....		
HMGRclustalW{halobacter}	.....	.....
.....		
HMGRclustalW{sulfolobus}	.....	.....
.....		
HMGRclustalW{ yeast2}	LVVQOKSATI EFSET.....	.....RSMPPA SSGLETPVTA
KDIIISEEIQ		
HMGRclustalW{ yeast1}	TAPVQKASTP VLTN.....	.....KTVIS GSKVKSLSSA
QSSSSGPPSS		
HMGRclustalW{phycomyces}	.....	.....
.....		
HMGRclustalW{ fusarium}	LPLGEYVPPT PMRTQ.....	.....PSTPA ITDDEAEG..
..LHMTKARP		
HMGRclustalW{ candida}	LKKPKKKASK TAVSV.....	.....PKAVV VKDSETTKSS
EILHSSSESE		
HMGRclustalW{dictyoste2}	..KGKSVNVE DLKDQ.....	.....EIIAL VDKGEIQP..
...HNLETRL		
HMGRclustalW{wheat1}	.....	.....
.....		
HMGRclustalW{ rice}	.....GQG GSR.....	.....RA.....A
PPEPAPMHGH		
HMGRclustalW{ corn}	.....SSGS AAA.....	.....PSRQHAQA
PAPCELLGSP		
HMGRclustalW{wheat3}	.....	.....
.....		
HMGRclustalW{wheat2}	.....	.....
.....		
HMGRclustalW{ soybean}	.....	.....
.....		
HMGRclustalW{rubbertre3}	.....PTG AC.....	.....AAPSLDCS
LSLPTKIHAP		
HMGRclustalW{rosyperiwi}	..T..NCTTL GC.....	.....AVPPPSVP
KIAPVVPQQP		
HMGRclustalW{ tomato}	..P...ATTTL GC.....	.....AVPAPPAR
QIAPMAPPQP		
HMGRclustalW{woodtobacc}	..P...ATTTL GCT.....	.....AVPPPPAL
QIVPMVPPQP		
HMGRclustalW{ potato}	..PCAAATTTL GC.....	.....VVPPPPVR
KIAPMVPPQP		
HMGRclustalW{radish}	.....LVTC PPP.....	.....PPP....S
QIVAAKLPNP		
HMGRclustalW{arabadosis1}	.....LVTC SPP.....	.....TP.....
IVSVAKLPNP		
HMGRclustalW{cucumismel}	.....LIDN NRY.....	.....AAPRSASA
VALPSKVDA		
HMGRclustalW{rubbertre2}	.....	.....
.....		
HMGRclustalW{rubbertrel}	.....LVTC PPA.....	.....NISTKTTI
IAAPTCLPTS		
HMGRclustalW{camptothec}	.....TVP CAA.....	.....APVDCPLP
PIKPKVDPV		
HMGRclustalW{arabados2}	.....MIPC NQ.....	.....SLDCREVL
PIKPNVDPP		
HMGRclustalW{chineseham}	VIKPLVVETE SAS.....	..RATFVLG.A .SGTSPPVAA
RTQELEIELP		

FIG. 32X

HMGRclustalW{chineseha2} VIKPLVVETE SAS..... .RATFVLG.A .SGTSPPVAA  
 RTQELEIELP  
 HMGRclustalW{syrianhamst} VIKPLVAETE STS..... .RATFVLG.A .SGGCSPVAL  
 GTQEPEIELP  
 HMGRclustalW{ rat} VIKPLVAEAE TSG..... .RATFVLG.A .SAASPPLAL  
 GAQEPGIELP  
 HMGRclustalW{ rabbit} VIKPLVAETD SPH..... .RAAFVVGGS .SFPDTSLVL  
 ETKEPEIELP  
 HMGRclustalW{ human} VIKPLVAETD TPN..... .RATFVVGNS .SLLDTSVL  
 VTQEPEIELP  
 HMGRclustalW{ mouse} .....  
 .....  
 HMGRclustalW{ xenopus} VIKPLPLETS P..... .KAKFIVG.. .DSSPLELSP  
 EDKNTMFDLP  
 HMGRclustalW{sea urchin} PVTASPRNSR SSSPVSSHVS KPARFTIGSS GSGSEDEEEE  
 VIKKEEVEWV  
 HMGRclustalW{ cockroach} ETRDELTTTR GMDG.....W VEVSSPVEHK YVQTEQPSCS  
 APEQPLEEPP  
 HMGRclustalW{drosophila} LFTIEDQSSA N..... ..ASTQTDLL  
 PLRHRLVGPI  
 HMGRclustalW{dictyoste1} .....SGKEQ EQ..... ..QQQQQQQQ  
 QQTPDITNQP  
 HMGRclustalW{schistosom} PKIKETLISD QVKQSPVLPK FSKKLNDIPL QSRKRIYCLH  
 KDDDYIDRND  
 HMGRclustalW{archaeoglo} .....  
 .....  
 HMGRclustalW{pseudomonas} .....  
 .....  
 Consensus VIKPLVAETE --S----- -RATFV-G-A -SA-PPPPA- -I-  
 PPEIELP

## FIG. 32Y

650	601
HMGRclustalW{methanobac}	.....MS.
...IMDDLME	
HMGRclustalW{methanococ}	.....MEN
YNDILEKMLN	
HMGRclustalW{halobacter}	.....MTD
AASLADRVRE	
HMGRclustalW{sulfolobus}	.....MK.
IDEVVEKLVK	
HMGRclustalW{ yeast2}	NNE.CVYALS SQDEPIRP.L SNLVELME.. ..KEQLKNMN
NTEVSNLVVN	
HMGRclustalW{ yeast1}	SEEDDSRDIE SLDKKIRP.L EELEALLS.. ..SGNTKQLK
NKEVAALVIH	
HMGRclustalW{phycomyces}	.....
.....	
HMGRclustalW{ fusarium}	ANL..... ..PNRS.N EELEKLLS.. ..ENALREMT
DEEVISLSMR	
HMGRclustalW{ candida}	SEQ..... ..SSRP.L EQVIELYK.. ..DGKVKTLV
DDEVVSLVTA	
HMGRclustalW{dictyoste2}	PNN..... ..F QRAVHIRR.. ..KLLARDLQ
KEHQRALHAQ	
HMGRclustalW{wheat1}	.....
.....	
HMGRclustalW{ rice}	G..... ..GGMMEGD
DEEIVAAVAS	
HMGRclustalW{ corn}	AA..... ..A.. ..PEKMPED
DEEIVASVVA	
HMGRclustalW{wheat3}	.....
.....	
HMGRclustalW{wheat2}	.....
.....	
HMGRclustalW{ soybean}	.....
.....	
HMGRclustalW{rubbertre3}	.....I VSTTT..... ..TSTLSDD
DEQIIKSVVS	
HMGRclustalW{rosyperiwi}	SK..... ..MV.I IEKPAPLI.. ..TPQNSEE
DEDIIKAVVA	
HMGRclustalW{ tomato}	S..... ..MS.M VEKPAPLI.. ..TSASSGE
DEEIIKSVVQ	
HMGRclustalW{woodtobacc}	SKV..... ..AA.M SEKPAPLV.. ..TPAASEE
DEEIIKSVVQ	
HMGRclustalW{ potato}	AKV..... ..ALS.Q TEKPSPII.. ..MPALSED
DEEIIQSVVQ	
HMGRclustalW{radish}	E..... ..QPPLPKE
DEEIVKSVLD	
HMGRclustalW{arabadosis1}	EP..... ..IV.. ..TESLPEE
DEEIVKSVID	
HMGRclustalW{cucumismel}	EA..... ..LN.. ..TIPLPEE
DEEVVKMVVD	
HMGRclustalW{rubbertre2}	.....
.....	
HMGRclustalW{rubbertrel}	EP..... ..LI.. ..APLVSEE
DEMIVNSVVD	
HMGRclustalW{camptothec}	P..... ..I.. ..SPPSSEE
DEEIIKSVVE	
HMGRclustalW{arabados2}	RE..... ..SELDSE
DEEIVKLVID	
HMGRclustalW{chineseham}	SE..... ..PRP.N EECLQILE.. SAEKGAKFLS
DAEIIQLVNA	



FIG. 32Z

HMGRclustalW{chineseha2} SE..... PRP.N EECLQILE.. SAEKGAKFLS  
 DAEIIQLVNA  
 HMGRclustalW{syrianhamst} SE..... PRP.N EECLQILE.. SAEKGAKFLS  
 DAEIIQLVNA  
 HMGRclustalW{ rat} SE..... PRP.N EECLQILE.. SAEKGAKFLS  
 DAEIIQLVNA  
 HMGRclustalW{ rabbit} KE..... PRP.N EECLQILG.. NAEKGAKFLS  
 DAEIIQLVNA  
 HMGRclustalW{ human} RE..... PRP.N EECLQILG.. NAEKGAKFLS  
 DAEIIQLVNA  
 HMGRclustalW{ mouse} .....  
 .....  
 HMGRclustalW{ xenopus} EE..... PRP.L DECVRILK.. NPDKGAQYLT  
 DAEVISLVNA  
 HMGRclustalW{sea urchin} LET..... .ELKAPRP.M PELLEIL... NVGKGPNALT  
 DDEVQLLVGA  
 HMGRclustalW{ cockroach} AS..... .NRS.I DECLSVC... KSDVGAQALS  
 DCEVMALVTS  
 HMGRclustalW{drosophila} KP..... PRP.V QECLDILNST EEGSGPAALS  
 DEEIVSIVHA  
 HMGRclustalW{dictyostel} TKTN..... .KKIPIKELS  
 NEEILIKLEK  
 HMGRclustalW{schistosom} SSSVSTFSNT CKNSNERPSN VLDLDMLTEK IKQGLGHELS  
 DTEILQLLSH  
 HMGRclustalW{archaeoglo} .....  
 .MQVLRLLDRR  
 HMGRclustalW{pseudomonas} .....  
 .....  
 Consensus SE-----PRP-N EECLQIL--- -AEKGAKSLS  
 DEEIIKLVVA

## FIG. 32AA

700  
 HMGRclustalW{methanobac} GR..IKLYEI E.RHVPVDEA VRIRREFIE. ....RTCGVK  
 ..LEHVSNYS  
 HMGRclustalW{methanococ} GE..IKPYQL D.KMFGSKIA TEIRRKFIE. ....KKVGIE  
 ..FKHICNYS  
 HMGRclustalW{halobacter} GD..LRLHEL E.AHADADTA AEARRLLVE. ....SQSGAS  
 ..LDAVGNYG  
 HMGRclustalW{sulfolobus} GE..ISFHEV D.NLLEANAA MVARRLALE. ....KIVGVG  
 ..LPSIGSTV  
 HMGRclustalW{ yeast2} G..KLPLYSL EKKLEDTTRA VLVRRKALST LAESPILVS.  
 ...EKLPFRN  
 HMGRclustalW{ yeast1} G..KLPLYAL EKKLGDTTRA VAVRRKALSI LAEAPVLAS.  
 ...DRLPYKN  
 HMGRclustalW{phycomyces} .....  
 .....  
 HMGRclustalW{ fusarium} G..KIPGYAL EKTLDGDFTRA VKIRRSIIAR NKAAADITHS  
 LDRSKLPYEN  
 HMGRclustalW{ candida} G..KLPLYAL EKQLGDNLRA VAIRRKALSD LADAPVLRS.  
 ...NKLPYLH  
 HMGRclustalW{dictyoste2} A..VVA-AAEK AATSGEDPSS IQPVVPPTSN LDFEGSLTN.  
 ....LPVDH  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} G..ALPSHRL ESRLGDCRRA ARLRREALR. ....RVTGRG  
 ..VEGLPFDG  
 HMGRclustalW{ corn} G..KVPSYAL EARLGDCRRA AGIRREALR. ....RITGRD  
 ..IEGLPLDG  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} G..SIPSYSL ESKLGNCKRA ALIRRETLQ. ....RMSGRS  
 ..LEGLPLDG  
 HMGRclustalW{rosyperiw} G..KIPSYSL ESKLGDCKRA AGIRREALQ. ....RITGKS  
 ..LEGLPLEG  
 HMGRclustalW{ tomato} G..KIPSYSL ESKLGDCKRA ASIRKEVMQ. ....RITGKS  
 ..LEGLPLEG  
 HMGRclustalW{woodtobacc} G..KMPSYSL ESKLGDCKRA ASIRKEALQ. ....RITGKS  
 ..LEGLPLEG  
 HMGRclustalW{ potato} G..KTPSYSL ESKLGDCKRA ASIRKEALQ. ....RITGKS  
 ..LEGLPLEG  
 HMGRclustalW{radish} G..VVPYSL ESRLGDCKRA ASIRREALQ. ....RLTGRS  
 ..IEGLPLDG  
 HMGRclustalW{arabadosis1} G..VIPSYSL ESRLGDCKRA ASIRREALQ. ....RVTGRS  
 ..IEGLPLDG  
 HMGRclustalW{cucumismel} G..SVPSYSL ESKLGDCKRA ASIRREALQ. ....RTTGRS  
 ..IHGLPFEG  
 HMGRclustalW{rubbertre2} .....  
 .....  
 HMGRclustalW{rubbertre1} G..KIPSYSL ESKLGDCKRA AAIRREALQ. ....RMTRRS  
 ..LEGLPVEG  
 HMGRclustalW{camptothec} G..TTPSYAL ESKLGDCKRA AAIRREALQ. ....RMTKKS  
 ..LAGLPLDG  
 HMGRclustalW{arabados2} G..TIPSYSL ETKLGDCKRA AAIRREAVQ. ....RITGKS  
 ..LTGLPLEG  
 HMGRclustalW{chineseham} K..HIPAYKL ETLMETHERG VSIRRQLLST K..LPEPSS.  
 ..LQYLPYRD

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## FIG. 32BB

HMGRclustalW{chineseha2} K..HIPAYKL ETLMETHERG VSIRRQLLST K..LPEPSS.  
 ..LQYLPYRD  
 HMGRclustalW{syrianhamst} K..HIPAYKL ETLMETHERG VSIRRQLLST K..LPEPSS.  
 ..LQYLPYRD  
 HMGRclustalW{ rat} K..HIPAYKL ETLMETHERG VSIRRQLLSA K..LAEPSS.  
 ..LQYLPYRD  
 HMGRclustalW{ rabbit} K..HIPAYKL ETLMETHERG VSIRRQLLSK K..LPEPSS.  
 ..LQYLPYRD  
 HMGRclustalW{ human} K..HIPAYKL ETLMETHERG VSIRRQLLSK K..LSEPSS.  
 ..LQYLPYRD  
 HMGRclustalW{ mouse} .....  
 .....  
 HMGRclustalW{ xenopus} K..HIPAYKL ETMMESPREG VAIRRQMLSD K..LPQRSA.  
 ..LQSLPYKN  
 HMGRclustalW{sea urchin} K..HIPAYKL ENILDNPERG VAVRRQIISK L..LPITDA.  
 ..LEKLPYAS  
 HMGRclustalW{ cockroach} G..HIAGYQL EKVVRNPERG VGIRRQILTK T..ADLKDA.  
 ..LDNLPYKN  
 HMGRclustalW{drosophila} GGTHCPLHKI ESVLDDPERG VRIRRQIIGS R..AKMPVGR  
 ..LDVLPYEH  
 HMGRclustalW{dictyostel} G..EVLAYRL ENELGDCSRA VEIRRMLLEK ....QLSKK.  
 ..IEPIPHEG  
 HMGRclustalW{schistosom} G..RLKTREL ESVVRNPFRA VELRRDLDS. ....TFLNNP  
 HIIERIPYKD  
 HMGRclustalW{archaeoglo} HYKSGKIRRA MSSRIPGFYK LSVEERLKKV AEFAGLSDEE  
 ..VKAVLSQG  
 HMGRclustalW{pseudomonas} .....MS LDSRLPAFRN LSPAARLDHI GQLLGLSHDD  
 ..VSLLANAG  
  
 Consensus G---IPSYSL ESKLGDCKRA VSIRREALSK K--LRITGSS --  
 LEGLPYEG

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## FIG. 32DD

```

IPMATTEGCL
  HMGRclustalW{phycomyces} .....
.PMATTEGCL
  HMGRclustalW{ fusarium} YNWERFFGAC CENVIGYMPL PVGVAGPLVI DGQ....SYF
IPMATTEGVL
  HMGRclustalW{ candida} YDYDRVFGAC CENVIGYMPL PVGVAGPLII DGK....PYH
IPMATTEGCL
  HMGRclustalW{dictyoste2} FDYTKVLGAC CENVIGYIPI PVGVAGPILL DGK....LVS
IPMATTEGCL
  HMGRclustalW{wheat1} .....
.....
  HMGRclustalW{ rice} MDYQAILGQC CEMPVGIVVQL PVGVAGPLLL DGR....EYH
VPMATTEGCL
  HMGRclustalW{ corn} FDYASILGQC CELPVGVVQL PVGVAGPLLL DGR....RFY
LPMATTEGCL
  HMGRclustalW{wheat3} .....
.....
  HMGRclustalW{wheat2} .....
.....
HMGRclustalW{ soybean} .....
.....
  HMGRclustalW{rubbertre3} FDYESILGQC CEMAIGYVQI PVGIAGPLLL DGK....EYT
VPMATTEGCL
  HMGRclustalW{rosyperiwi} FDYASILGQC CEMPVGIVVQL PVGIAGPLLL DGR....EYM
LPMATTEGCL
  HMGRclustalW{ tomato} FNYESILGQC CEMPIGYVQI PVGIAGPLLL NGK....EFS
VPMATTEGCL
  HMGRclustalW{woodtobacc} FDYESILGQC CEMPIGYVQI PVGIAGPLLL DGR....EYS
VPMATTEGCL
  HMGRclustalW{ potato} FDYSSILGQC CEMPVGIVVQI PVGIAGPLLL DGR....EYS
VPMATTEGCL
  HMGRclustalW{radish} FDYDSILGQC CEMPVGIVQI PVGIAGPLLL DGY....EYS
VPMATTEGCL
  HMGRclustalW{arabadopsis1} FDYESILGQC CEMPVGIVQI PVGIAGPLLL DGY....EYS
VPMATTEGCL
  HMGRclustalW{cucumismel} FDYESILGQC CEMPVGIVVQI PVGIAGPLLL DGF....EYT
VPMATTEGCL
  HMGRclustalW{rubbertre2} .....
.....
  HMGRclustalW{rubbertre1} FDYESILGQC CEMPVGIVVQI PVGIAGPLLL NGR....EYS
VPMATTEGCL
  HMGRclustalW{camptothec} FDYDSILGQC CEMPVGIVVQI PVGIAGPLLL DGR....EYS
VPMATTEGCL
  HMGRclustalW{arabadops2} FDYNSILGQC CEMPVGIVVQI PVGIAGPLLL DGV....EYS
VPMATTEGCL
  HMGRclustalW{chineseham} YNYSLVMGAC CENVIGYMPI PVGVAGPLCL DGK....EYQ
VPMATTEGCL
  HMGRclustalW{chineseha2} YNYSLVMGAC CENVIGYMPI PVGVAGPLCL DGK....EYQ
VPMATTEGCL
  HMGRclustalW{syrianhamst} YNYSLVMGAC CENVIGYMPI PVGVAGPLCL DGK....EYQ
VPMATTEGCL
  HMGRclustalW{ rat} YNYSLVMGAC CENVIGYMPI PVGVAGPLCL DGK....EYQ
VPMATTEGCL
  HMGRclustalW{ rabbit} YNYSLVLGAC CENVIGYMPI PVGVVGPLCL DGK....EFQ
VPMATTEGCL
  HMGRclustalW{ human} YNYSLVMGAC CENVIGYMPI PVGVAGPLCL DEK....EFQ
VPMATTEGCL
  HMGRclustalW{ mouse} .....
.....
  HMGRclustalW{ xenopus} YNYSLVMGAC CENVIGYMPI PVGVAGPLLL NNK....EYQ

```



VPMATTEGCL	HMGRclustalW{sea urchin}	YDYSFVSGAC	CENVIGYMPV	PVGVAGPLLL	DGQ....EFQ
VPMATTEGCL	HMGRclustalW{ cockroach}	YDYLKVMGAC	CENVIGYMPV	PVGVAGPLNL	DGR....LVH
VPLATTEGCL	HMGRclustalW{drosophila}	FDYRKVLNAC	CENVLGYPVI	PVGYAGPLLL	DGE....TYY
VPMATTEGAL	HMGRclustalW{dictyostel}	FDFAKVQGQC	CENVIGYPVI	PVGTAGPIQL	NGQ....LVT
IPMATTEGCL	HMGRclustalW{schistosom}	YDYRLVYGQC	CEEVIGYMPI	PVGKIGPLLL	DGR....SHY
IPLATTEGCL	HMGRclustalW{archaeoglo}	.LPLDVADRM	IENVIGTFEL	PLGIATNFLI	DGK....DYL
IPMAIEEPSV	HMGRclustalW{pseudomonas}	ALPMDIANGM	IENVIGTFEL	PYAVASNFQI	NGR....DVL
VPLVVEPSI					

Consensus FDY-SVLG-C CENVIGY--I PVGVAGPLLL DGK----EYS

VPMATTEGCL

HMGCoA binding

**E**

## FIG. 32FF

800  
 HMGRclustalW{methanobac} VASVNRGCSV ITRAGGATVR VTGDSMT.RA PVIRTGSVVE  
 ALQLREWIYE  
 HMGRclustalW{methanococ} VASVNRGCSI ITKCGGATVR VIDDKMT.RA PCLKTKSVVD  
 AIKVRDWIRE  
 HMGRclustalW{halobacter} LASVNRGCSV INSAGGATAR VLKSGMT.RA PVFRVADVAE  
 AEALVSWTRD  
 HMGRclustalW{sulfolobus} IASVNRGIKA VTLSGGVRAK VLKDEMT.RA PVFKFDSIEQ  
 IPNFLKFIEE  
 HMGRclustalW{ yeast2} VASAMRGCKA INAGGGATTV LTKDGMT.RG PVVRFPTLIR  
 SGACKIWLDS  
 HMGRclustalW{ yeast1} VASAMRGCKA INAGGGATTV LTKDGMT.RG PVVRFPTLKR  
 SGACKIWLDS  
 HMGRclustalW{phycomyces} VASTARGCKA INAGGGASTI VIADGMT.RG PCVEFPTILR  
 AAACKLWIEN  
 HMGRclustalW{ fusarium} VASASRGCKA INSGGGAITV LTADGMT.RG PCVAFETLER  
 AGAAKLWLDS  
 HMGRclustalW{ candida} VASAMRGCKA INLGGGVTTV LTKDGMT.RG PCVKFPSLKR  
 AGQCKLWLDS  
 HMGRclustalW{dictyoste2} VASTHRGAKA ITKSGGAKTV LLQSGMT.RA PVCRLPSSIR  
 AGELKQWIEN  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} VASVNRVQGV HLVSGGAFSV LLRDAMS.RA PAVKLPCPMR  
 AAELKAFAEA  
 HMGRclustalW{ corn} VASTNRGCKA IAESGGATSV VLRDAMT.RA PVARFPTARR  
 AAELKAFLD  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} VASANRGCKA IYASGGATSV LLRDGMT.RA PVVRFPTAKR  
 AADLKFFMED  
 HMGRclustalW{rosyperiwi} VASTNRGCKA ILASGGANSV LLRDGMT.RA PVVRFGTAKR  
 AAELKFYMED  
 HMGRclustalW{ tomato} VASTNRGCKA IYASGGATCI LLRDGMT.RA PCVRFGTAKR  
 AAELKFFVED  
 HMGRclustalW{woodtobacc} VASTNRGCKA IYASGGATSV LLRDGMT.RA PCVRFGTAKR  
 AAELKFFVED  
 HMGRclustalW{ potato} VASTNRGCKA IFVSGGADSV LLRDGMT.RA PVVRFPTAKR  
 AAELKFFVED  
 HMGRclustalW{radish} VASTNRGCKA MYVSGGATST VLKDEMT.RA PVVRFASARR  
 ASELKFFLES  
 HMGRclustalW{arabadopsis1} VASTNRGCKA MFISGGATST VLKDEMT.RA PVVRFASARR  
 ASELKFFLEN  
 HMGRclustalW{cucumismel} VASTNRGCKA IYASGGATSM LLKDEMT.RA PVVRFSGAKR  
 ASELKFFLED  
 HMGRclustalW{rubbertre2} .....  
 .....  
 HMGRclustalW{rubbertre1} VASTNRGCKA IYLSGGATSV LLKDEMT.RA PVVRFASATR  
 AAELKFFLED  
 HMGRclustalW{camptothec} VASTNRGCKA IFACGGATSV LLRDAMT.RA PVVRFSGAKR  
 AADLKFFLEN  
 HMGRclustalW{arabadops2} VASTNRGCKA IHLSGGAFSV LVKDAMT.RA PVVRFPSARR  
 AALVMFYLQD  
 HMGRclustalW{chineseham} VASTNRGCRA IGLGGGASSR VLADGMT.RG PVVRLPRACD  
 SAEVKAWLET

751

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FIG. 32GG

HMGRclustalW{chineseha2}	VASTNRGCRA	IGLGGGASSR	VLADGMT.RG	PVVRLPRACD
SAEVKAWLET				
HMGRclustalW{syrianhamst}	VASTNRGCRA	IGLGGGASSR	VLADGMT.RG	PVVRLPRACD
SAEVKAWLET				
HMGRclustalW{rat}	VASTNRGCRA	ISLGGGASSR	VLADGMS.RG	PVVRLPRACD
SAEVKSWLET				
HMGRclustalW{rabbit}	VASTNRGCRA	ICLGGGASSR	VLADGMT.RG	PVVRLPRACD
SAEVKAWLET				
HMGRclustalW{human}	VASTNRGCRA	IGLGGGASSR	VLADGMT.RG	PVVRLPRACD
SAEVKAWLET				
HMGRclustalW{mouse}	.....	.....	.....	.....
.....				
HMGRclustalW{xenopus}	VASTNRGCRA	IMLGGGAKSR	VLADGMT.RG	PVVRLPTACD
AAEVKAWLDS				
HMGRclustalW{sea urchin}	VASTNRGCRA	LRSAGGIHSV	LIGDGMT.RG	PLVRLPSAQE
AGAIIQWLEV				
HMGRclustalW{cockroach}	VASTNRGMRA	LMRCG.VTSR	IVADGMT.RG	PVVRFPNIDR
ASEAMLWMQV				
HMGRclustalW{drosophila}	VASTNRGCKA	LSVRG.VRSV	VEDVGMT.RA	PCVRFPSSVAR
AAEAKSWIEN				
HMGRclustalW{dictyostel}	VASTHRGCKA	ITESGGAKCT	ITSRGMT.RA	PVVRFSDIVK
ASEFVSWIND				
HMGRclustalW{schistosom}	VASTNRGCRA	IFLAGGIKSV	VYRDQMT.RA	PVVWFPSIID
SVKCIAWIDS				
HMGRclustalW{archaeoglo}	VAAASNAARM	ARESGGFTTD	YTGSLMIGQI	QVTKLLNPNA
AKFEVLRQKD				
HMGRclustalW{pseudomonas}	VAAASYMAKL	ARANGGFTTS	SSAPLMHAQV	QIVGIQDPLN
ARLSLLRRKD				
Consensus	VASTNRGCKA	I-LSGGATSV	VLADGMT-RA	PVVRFPSAKR
AAELKFWLED				

Table 1. Demographic characteristics of the study population	
Age (years)	Mean (SD)
Male	55.2 (10.5)
Female	56.8 (11.2)
Marital status	
Married	78.5%
Single	21.5%
Education level	
High school or above	65.2%
Below high school	34.8%
Occupation	
White collar	45.1%
Blue collar	54.9%
Income (USD/month)	
< 1000	12.3%
1000-2000	35.7%
2000-3000	28.9%
> 3000	23.1%
Health insurance	
Yes	89.4%
No	10.6%
Comorbidities	
Hypertension	42.1%
Diabetes	18.5%
Cholesterol	31.2%
Smoking status	
Current smoker	15.3%
Former smoker	22.7%
Non-smoker	62.0%
Alcohol consumption	
Regular	8.9%
Occasional	25.4%
Never	65.7%

850		801			
HMGRclustalW{methanobac}	NM..DALREE	AESTTRHGKL	VKIDPI....	IVAGSYVYPR	
FVYTTGDSMG					
HMGRclustalW{methanococ}	NF..ERIKEV	AESTTRHGKL	IKIEPI....	LIVGRNLYPR	
FVFKTGDAMG					
HMGRclustalW{halobacter}	NF..AALKEA	AEETTNGHGL	LDVTP.....	YVVGNSVYLR	
FRYDTKDAMG					
HMGRclustalW{sulfolobus}	NL..EKIRNI	ANSTSHHGKL	KSITP.....	FVLGNNVWLR	
FSPETGDAMG					
HMGRclustalW{ yeast2}	EEGQNSIKKA	FNSTSRFARL	QHIQT.....	CLAGDLLFMR	
FRTTTGDAMG					
HMGRclustalW{ yeast1}	EEGQNAIKKA	FNSTSRFARL	QHIQT.....	CLAGDLLFMR	
FRTTTGDAMG					
HMGRclustalW{phycomycs}	EG.NDIVTNA	FNSTSRFARL	RKLKI.....	ALAGKLVFIR	
FSTTTGDAMG					
HMGRclustalW{ fusarium}	EAGQDMMKKA	FNSTSRFARL	QSMKT.....	ALAGTNLYIR	
FKTTTGDAMG					
HMGRclustalW{ candida}	DEGQEEMKKA	FNSTSRFARL	QHLQT.....	ALAGDLLFIR	
FRTVTGDAMG					
HMGRclustalW{dictyoste2}	QENFYQVASA	FNSTSRFARL	KSIKV.....	VIAGRLVYLR	
FKSSTGDAMG					
HMGRclustalW{wheat1}	.....	.....	.....	.....	
.....GDAMG					
HMGRclustalW{ rice}	PANFELLAAV	FNRSSRFGR	QDIRC.....	ALAGRNLYMR	
FSCITGDAMG					
HMGRclustalW{ corn}	PANFDTLSVV	FNRSSRFARL	QGVQC.....	AMAGRNLYMR	
FSCSTGDAMG					
HMGRclustalW{wheat3}	.....	.....	.....	.....	
.....GDAMG					
HMGRclustalW{wheat2}	.....	.....	.....	.....	
.....GDAMG					
HMGRclustalW{ soybean}	.....	.....	.....	.....	
.....					
HMGRclustalW{rubbertre3}	PDNFDTIAVV	FNKSSRFARL	QSVQC.....	AIAGKNLYMR	
FSCSTGDAMG					
HMGRclustalW{rosyperiwi}	TQNFETISVV	FNKSSRFARL	QSVQC.....	AIAGKNLYIR	
FSCSTGDAMG					
HMGRclustalW{ tomato}	PIKFESLANV	FNQSSRFARL	QRIQC.....	AIAGKNLYMR	
LCCSTGDAMG					
HMGRclustalW{woodtobacc}	PVKFETLAAV	FNQSSRFARL	QRIQC.....	AIAGKNLYMR	
FVCSTGDAMG					
HMGRclustalW{ potato}	PLNFETLSLM	FNKSSRFARL	QGIQC.....	AIAGKNLYIT	
FSCSTGDAMG					
HMGRclustalW{radish}	PENFETLAVV	FNRSSRFARL	QSVMC.....	TLAGKNAYVR	
FSCSTGDAMG					
HMGRclustalW{arabadopsis1}	PENFDTLAVV	FNRSSRFARL	QSVKC.....	TIAGKNAYVR	
FCCSTGDAMG					
HMGRclustalW{cucumismel}	PSNFDTLAVV	FNRSSRFARL	QSIRC.....	SIAGKNLYVR	
FCCSTGDAMG					
HMGRclustalW{rubbertre2}	.....	.....	.....	.....	
.....					
HMGRclustalW{rubbertrel}	PDNFDTLAVV	FNKSSRFARL	QGIKC.....	SIAGKNLYIR	
FSCSTGDAMG					
HMGRclustalW{camptothec}	PLNFETLAAV	FNSSSRFGKL	QNIKC.....	AIAGKNLYMR	
YSCSTGDAMG					
HMGRclustalW{arabadops2}	PSNFERLSLI	FNKSSRFARL	QSITC.....	TIAGRNLYPR	
FACSTGDAMG					
HMGRclustalW{chineseham}	PEGFAVIKDA	FDSTSRFARL	QKLHV.....	TMAGRNLYIR	
FQSKTGDAMG					

HMGRclustalW{chineseha2}	PEGFAVIKDA	FDSTSRFARL	QKLHV.....	TMAGRNLVIR
FQSKTGDAMG				
HMGRclustalW{syrianhamst}	PEGFAVIKDA	FDSTSRFARL	QKLHV.....	TMAGRNLVIR
FQSKTGDAMG				
HMGRclustalW{rat}	PEGFAVVKEA	FDSTSRFARL	QKLHV.....	TLAGRNLVIR
LQSKTGDAMG				
HMGRclustalW{rabbit}	PEGFAVIKEA	FDSTSRFARL	QKLHI.....	SMAGRNLVIR
FQSRTGDAMG				
HMGRclustalW{human}	SEGFAVIKEA	FDSTSRFARL	QKLHT.....	SIAGRNLVIR
FQSRSGDAMG				
HMGRclustalW{mouse}	.....	.....	.....	.....
.....				
HMGRclustalW{xenopus}	AEGFKVIKDA	FDSTSRFARL	GRLQN.....	CVAGRNLVIR
FQSKTGDAMG				
HMGRclustalW{sea urchin}	PENFAAIKER	FESTSRFAKL	KSIQT.....	ALAGRYMFLR
FKALTGDAMG				
HMGRclustalW{cockroach}	PYNFEQIKKN	FDSTSRFARL	SKIHI.....	RVAGRHLFIR
FIATTGDAMG				
HMGRclustalW{drosophila}	DENYRVVKTE	FDSTSRFGRL	KDCHI.....	AMDGPQLVIR
FVAITGDRMG				
HMGRclustalW{dictyostel}	TDNYQALKAV	FDSTSRFARL	SAIKC.....	TIAGRSVYIR
FKCDTGDAMG				
HMGRclustalW{schistosom}	EEGFQTLKSA	FDK TSAHVNL	LSVFA.....	CPAGRYIHIR
FAARTGDAMG				
HMGRclustalW{archaeoglo}	EIIERANECD	PMLVNLGGGC	KDIEAR.VID	TIMGKMLIVH
LIVDVKDAMG				
HMGRclustalW{pseudomonas}	EIIELANRKD	QLLNSLGGGC	RDIEVHTFAD	TPRGPMMLVAH
LIVDVRDAMG				
	Consensus	PENFETLK-A	FNSTSRFARL	QSIQC-----
FSCSTGDAMG				AIAGRNLVIR

(continued)



## FIG. 32JJ

851

900  
 HMGRclustalW{methanobac} MNMVTIATER ALELLT...R ETGAHV..IA LSGNLCTDKK  
 PAAVNWIEGR  
 HMGRclustalW{methanococ} MNMVTIATEK ACNFIEGELK KEGIFVKTVA VSGNACVDKK  
 PSGMNLINGR  
 HMGRclustalW{halobacter} MNMATIATEA VCGVVE...A ETAASL..VA LSGNLCSDKK  
 PAAINAVEGR  
 HMGRclustalW{sulfolobus} MNMVTIAVEK VCEFIE.... ENFPSADCLA VSGNMCSDKK  
 QTNVNSLFGR  
 HMGRclustalW{ yeast2} MNMISKGVEY SLKQMVEEY.. .GWEDMEVVS VSGNYCTDKK  
 PAAINWIEGR  
 HMGRclustalW{ yeast1} MNMISKGVEY SLKQMVEEY.. .GWEDMEVVS VSGNYCTDKK  
 PAAINWIEGR  
 HMGRclustalW{phycomyces} MNM.....  
 .....  
 HMGRclustalW{ fusarium} MNMISKGVEH ALSVMANDG.. .GFDDMQIIS VSGNYCTDKK  
 AAALNWIDGR  
 HMGRclustalW{ candida} MNMISKGVEY ALKQMTEVF.. .GWDDMMVVS VSGNYCTDKK  
 PAAVNWINGR  
 HMGRclustalW{dictyoste2} MNMVSKGVEK ALEVITEY.. ..FPMEVLS LSGNVCTDKK  
 PSSINWLEGR  
 HMGRclustalW{wheat1} MNMVSKGVEN VLGYIRNN.. ..FPDMDVIS ISGNYCSDKK  
 ATAVNWIDGR  
 HMGRclustalW{ rice} MNMVSKGVEN VLGYLQNV.. ..FPDMDVIS VSGNYCSDKK  
 PTAVNWIEGR  
 HMGRclustalW{ corn} MNMVSKGVQN VLDFLQDD.. ..FHDMDVIS ISGNFCSDKK  
 PSAVNWIEGR  
 HMGRclustalW{wheat3} MNMISKGVQN VLDYLQDD.. ..FPDMDVIS ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{wheat2} MNMISKGVQH VLDYLEED.. ..FPDMDVVS ISGNFCSDKK  
 SAAVNWIEGR  
 HMGRclustalW{ soybean} .....  
 .....  
 HMGRclustalW{rubbertre3} MNMVSKAVQN VIDYLQND.. ..FPDMDVIG LTGNFCADKK  
 AAAVNWIEGR  
 HMGRclustalW{rosyperiwi} MNMVSKGVQN VLEFLQTD.. ..YPDMDVLG ISGNFCADKK  
 PAAVNWIEGR  
 HMGRclustalW{ tomato} MNMVSKGVQN VLDYLQNE.. ..YPDMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{woodtobacc} MNMVSKGVQN VLDYLQNE.. ..YPDMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{ potato} MNMVSKGVQN VLDYLQSE.. ..YPDMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{radish} MNMVSKGVQN VLEFLTED.. ..FPDMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{arabadosis1} MNMVSKGVQN VLEYLTDD.. ..FPDMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{cucumismel} MNMVSKGVQN VLEFLQHD.. ..FSDMEVIG ISGNFCADKK  
 PAAVNWIEGR  
 HMGRclustalW{rubbertre2} .....LESD.. ..FADMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{rubbertrel} MNMVSKGVQN VLEFLQSD.. ..FSDMDVIG ISGNFCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{camptothec} MNMISKGVQN VLDFLQDD.. ..FPDMDVIG ISGNYCSDKK  
 PAAVNWIEGR  
 HMGRclustalW{arabados2} MNMVSKGVQN VLDFVKSE.. ..FPDMDVIG ISGNYCSDKK  
 ASAVNWIEGR  
 HMGRclustalW{chineseham} MNMISKGTEK ALLKLQEF.. ..FPEMQILA VSGNYCTDKK  
 PAAINWIEGR

## FIG. 32KK

HMGRclustalW{chineseha2} MNMISKGTEK ALLKLQEF... ..FPEMQILA VSGNYCTDKK  
 PAAINWIEGR  
 HMGRclustalW{syrianhamst} MNMISKGTEK ALVKLQEF... ..FPEMQILA VSGNYCTDKK  
 PAAVNWIEGR  
 HMGRclustalW{ rat} MNMISKGTEK ALLKLQEG... ..VPELQILA VSGNYCTDKK  
 PAAINWIEGR  
 HMGRclustalW{ rabbit} MNMISKGTEK ALSKLHEY... ..FPEMQILA VSGNYCTDKK  
 PAAVNWIEGR  
 HMGRclustalW{ human} MNMISKGTEK ALSKLHEY... ..FPEMQILA VSGNYCTDKK  
 PAAINWIEGR  
 HMGRclustalW{ mouse} .....EK ALLKLQEF... ..FPDMQILA VSGNYCTDKK  
 PAAINWIEGR  
 HMGRclustalW{ xenopus} MNMISKVTEQ ALARLQEE... ..FPDLHVLA VSGNYCTDKK  
 PAAINWIEGR  
 HMGRclustalW{sea urchin} MNMISKGTEQ ALHALQTM... ..FPNIEIMS LSGNYCTDKK  
 VAAINWIEGR  
 HMGRclustalW{ cockroach} MNMLSGTEV ALAYVQQV... ..YPDMEILS LSGNFCTDKK  
 PAAVNWIEGR  
 HMGRclustalW{drosophila} MNMVSKALRW PFAEFTLH... ..FPDMQIIS LSGNFCCDKK  
 PAAINWIKGR  
 HMGRclustalW{dictyoste1} MNMVSKGVEA VLEHLKII... ..FDDMTLLS ISGNMCTDKK  
 PSSINWTEGR  
 HMGRclustalW{schistosom} MNMVSKATDS ALHCLKKY... ..FSNMQVIS LSGNMCTDKK  
 PATINTILGR  
 HMGRclustalW{archaeoglo} ANAVNTMCEK VAPFIERITG .GKVYLRIIS NLAAYRLARA  
 KAVFDKDVIG  
 HMGRclustalW{pseudomonas} ANTVNTMAEA VAPLMEAITG .QVRLRILS NLADLRLARA  
 QVRITPQQLE  
  
 Consensus MNMVSKGVEN VL--LQED-- -GFPDMDVIS ISGNYCTDKK  
 PAAVNWIEGR

NADH binding domain 1 (concluded)

098573-1344

## 901

950					
HMGRclustalW{methanobac}	GKSITAEITV	PGEMVESVLK	TTPEAVVEVN	TAKNLIGSAA	
AG..SMG.FN					
HMGRclustalW{methanococ}	GKSIVAEVFL	TEKEVNKYLK	TTSQAIAEVN	RLKNYIGSAI	
SN..SMG.FN					
HMGRclustalW{halobacter}	GRSVTADVRI	PREVVEERLH	TPPERGRELN	TRKNLVGSAK	
AA..SLG.FN					
HMGRclustalW{sulfolobus}	GKTVLAEALI	KKDVIRNILH	SNAQLIHDIN	LRKNWLGTAR	
AG..SLSQFN					
HMGRclustalW{ yeast2}	GKSVVAEATI	PGDVVKSVLK	SDVSALVELN	ISKNLVGSAM	
AG..SVGGFN					
HMGRclustalW{ yeast1}	GKSVVAEATI	PGDVVRKVLK	SDVSALVELN	IAKNLVGSAM	
AG..SVGGFN					
HMGRclustalW{phycomyces}	.....	.....	.....	.....	
.....					
HMGRclustalW{ fusarium}	GKGVVAEAI	PGEVVRSVLK	SDVDSLVELN	VAKNLIGSAM	
AG..SVGGFN					
HMGRclustalW{ candida}	GKSVVAEASI	PKDAVVKVLK	SSVKAVVDVN	VNKNLIGSAM	
AG..SVGGFN					
HMGRclustalW{dictyoste2}	GKSVVAEAVI	SGDIVRDVLK	TTVEALVSLN	IDKNLIGSAM	
AG..SIGGFN					
HMGRclustalW{wheat1}	GKSVVCEATI	KGRVVQSVID	TTVEKLVELN	IIKNLAGSAV	
AG..ALGGFN					
HMGRclustalW{ rice}	GKSVVCEAII	KGDVVQKVLK	TTVEKLVELN	IIKNLAGSAV	
AG..ALGGFN					
HMGRclustalW{ corn}	GKSVVCEAVI	GEEVVKKVLK	TDVQSLVELN	TIKNLAGSAV	
AG..ALGGFN					
HMGRclustalW{wheat3}	GKSVVCEAVI	REELLKKVLK	TNVQSLVELN	VIKNLAGSAV	
AG..ALGGFN					
HMGRclustalW{wheat2}	GKSVVCEAII	REEVVEKVLD	TNVQSLVELN	VIKNLAGSAV	
AG..ALGGFN					
HMGRclustalW{ soybean}	.....	.....LK	TNVSALVELN	MLKNLAGSAV	
AG..ALGGFN					
HMGRclustalW{rubbertre3}	GKSVVCEAII	KEEVVKKVLK	TNVAALVELN	MIKNLTGSAM	
AG..SLGGFN					
HMGRclustalW{rosyperiwi}	GKSVVCEAII	KEEIVKTVLK	TEVAALIELN	MVKNLAGSAI	
AG..ALGGFN					
HMGRclustalW{ tomato}	GKSVVCEAII	TEEVVKKVLK	TEVAALVELN	MLKNLTGSAM	
AG..ALGGFN					
HMGRclustalW{woodtobacc}	GKSVVCEAII	TEEVVKKVLK	TEVAALVELN	MLKNLTGSAM	
AG..ALGGFN					
HMGRclustalW{ potato}	GKSVVCEAII	KEEVVKKVLK	TEVAALVELN	MLKNLTGSAM	
AG..ALGGFN					
HMGRclustalW{radish}	GKSVVCEAVI	RGETVNKVLK	TSVASLVELN	MLKNLTGSAI	
AG..SLGGFN					
HMGRclustalW{arabidopsis1}	GKSVVCEAVI	RGEIVNKVLK	TSVAALVELN	MLKNLAGSAV	
AG..SLGGFN					
HMGRclustalW{cucumismel}	GKSVVCEAVI	KDEVVRKVLK	TSVASLVELN	MLKNLTGSAM	
AG..ALGGFN					
HMGRclustalW{rubbertre2}	GKSVVCEAII	KEEVVKKVLK	TDVALLVELN	MLKNLAGSAV	
AG..ALGGFN					
HMGRclustalW{rubbertrel}	GKSVVCEAII	KEEVVKKVLK	TNVASLVELN	MLKNLAGSAV	
AG..ALGGFN					
HMGRclustalW{camptothec}	GKSVVCEAVI	KEEVVKKVLK	TNVASLVELN	MLKNLTGSAM	
AG..ALGGFN					
HMGRclustalW{arabidops2}	GKHVVCEAFI	KAEIVEKVLK	TSVEALVELN	TLKNLVGSAM	
AG..SLGGFN					
HMGRclustalW{chineseham}	GKTVVCEAVI	PAKVREVLK	TTTEAMIDVN	INKNLVGSAM	

## FIG. 32MM

AG..SIGGYN  
 HMGRclustalW{chineseha2} GKTVVCEAVI PAKVVREVLK TTTEAMIDVN INKNLVGSAM  
 AG..SIGGYN  
 HMGRclustalW{syrianhamst} GKTVVCEAVI PARVVREVLK TTTEAMIDVN INKNLVGSAM  
 AG..SIGGYN  
 HMGRclustalW{ rat} GKTVVCEAVI PAKVVREVLK TTTEAMVDVN INKNLVGSAM  
 AG..SIGGYN  
 HMGRclustalW{ rabbit} GKTVVCEAVI PAKVVREVLK TTTEAMIDVN INKNLVGSAM  
 AG..SIGGYN  
 HMGRclustalW{ human} GKSVVCEAVI PAKVVREVLK TTTEAMIEVN INKNLVGSAM  
 AG..SIGGYN  
 HMGRclustalW{ mouse} GKTVVCEAVI PAKVVREVLK TTTEAMVDVN INKNLVGSAM  
 AG..SIGGYN  
 HMGRclustalW{ xenopus} GKSVVCEAII PAKVVREVLK SSTEALVEVN INKNFIGSAM  
 AG..SIGGYN  
 HMGRclustalW{sea urchin} GKSVVCEATV PAHIVQQVLK TSASALVDLN IHKNLVGSAM  
 AG..SIGGFN  
 HMGRclustalW{ cockroach} GKSVVCEAIV PADIKSVLK TSVQALMDVN ITKNLIGSAV  
 AG..SIGGFN  
 HMGRclustalW{drosophila} GKRVTTECTI SAATLRSVLK TDAKTLVECN KLKQMGGSAM  
 AG..SIGGNN  
 HMGRclustalW{dictyostel} GRSVVCEAMI TGDVVQRVLK TNVQALVDLN IAKNLIGSAM  
 AG..SIGGFN  
 HMGRclustalW{schistosom} GKSVIAEAHL SADVLAQVLH TNAQRLARLT HSKNWIGSAM  
 AGCPGMMGCN  
 HMGRclustalW{archaeoglo} .....GEEVV EGIMLAYAFA AADPFRCAH NKGIMNGISA  
 LM.....  
 HMGRclustalW{pseudomonas} TAEFSGEAVI EGILDAYAFA AVDPYRAATH NKGIMNGIDP  
 LI.....  
  
 Consensus GKSVVCEAVI PAEVVRKVLK TTVEALVELN ILKNLVGSAM AG--  
 SLGGFN

71/78

## FIG. 32NN

951

1000  
 HMGRclustalW{methanobac} AHYANIIGAI FLATGQDEAH IVEGSLGVTI AEERK.....  
 .....GDLYF  
 HMGRclustalW{methanococ} AHYANIIGAI FLATGQDEAH IVEGSLGITM AEVED.....  
 .....DGLYF  
 HMGRclustalW{halobacter} AHVANVVAAM FLATGQDEAQ VVEGANAITT AEVQD.....  
 .....GDLYV  
 HMGRclustalW{sulfolobus} AHFANIVTAI FIATGQDVAQ IVESSSGYTW TEVRG.....  
 .....EDLYI  
 HMGRclustalW{ yeast2} AHAANLVTAL FLALGQDPAQ NVESSNCITL MKEVD.....  
 .....GDLRI  
 HMGRclustalW{ yeast1} AHAANLVTAV FLALGQDPAQ NVESSNCITL MKEVD.....  
 .....GDLRI  
 HMGRclustalW{phycomyces} .....  
 .....  
 HMGRclustalW{ fusarium} AHAANIVAAI FLATGQDPAQ VVESANCITI MKNLN.....  
 .....GALQI  
 HMGRclustalW{ candida} AQAANMVTAV YLALGQDPAQ NVESSNCITL MTETED....  
 .....GDLKV  
 HMGRclustalW{dictyoste2} AHASNIVTAL YIATGQDPAQ NVESSNCITL MESINGG...  
 .....KDLYI  
 HMGRclustalW{wheat1} AHASNIATAL FIATGQDPAQ NVESSQCITM LEAVNEG...  
 .....KDLHI  
 HMGRclustalW{ rice} AHASNIVTAL FIATGQDPAQ NVESSQCITM LEEVNDG...  
 .....DDLHI  
 HMGRclustalW{ corn} AHASNIVTAI FIATGQDPAQ NVESSHCITM LEPVNAG...  
 .....RDLHI  
 HMGRclustalW{wheat3} AHASNIVTAI FIATGQDPAQ NVESSQCIAM LEAVNDG...  
 .....KDLHI  
 HMGRclustalW{wheat2} AHASNIVSAI FIATGQDPAQ NVESSQCITM LEAVNGG...  
 .....RDLHI  
 HMGRclustalW{ soybean} AHASNIVSAI FIATGQDPAQ NVESSHCITM MEAINDG...  
 .....RDLHI  
 HMGRclustalW{rubbertre3} AHASNMVTAV YIATGQDPAQ NVESSHCITM MEAVNDG...  
 .....KDLHI  
 HMGRclustalW{rosyperiwi} AHASNIVSAI FIATGQDPAQ NVESSQCITM MEAVNDG...  
 .....KDLHI  
 HMGRclustalW{ tomato} AHASNIVSAV FIATGQDPAQ NIESSHCITM MEAVNDG...  
 .....KDLHI  
 HMGRclustalW{woodtobacc} AHASNIVSAV YIATGQDPAQ NIESSHCITM MEAVNDG...  
 .....KDLHV  
 HMGRclustalW{ potato} AHASNIVSAV YLATGQDPAQ NVESSHCITM MEAVNDG...  
 .....KDLHV  
 HMGRclustalW{radish} RHASNIVSAV FLATGQDPAQ NVESSQCITM MEAINDG...  
 .....KDIHI  
 HMGRclustalW{arabadopsis1} AHASNIVSAV FIATGQDPAQ NVESSQCITM MEAINDG...  
 .....KDIHI  
 HMGRclustalW{cucumismel} AHSSNIVSAI FLATGQDPAQ NVESSHCITM MEPVNNG...  
 .....RDLHI  
 HMGRclustalW{rubbertre2} AHAGNIVSAI FIATGQDPAQ NVESSHCITM MEAVNDG...  
 .....KDLHI  
 HMGRclustalW{rubbertrel} AHAGNIVSAI FIATGQDPAQ NVESSHCITM MEAVNDG...  
 .....KDLHI  
 HMGRclustalW{camptothec} AHASNIVSAV YLATGQDPAQ NVESSHCITM MEAINDG...  
 .....KDLHV  
 HMGRclustalW{arabadops2} AHSSNIVSAV FIATGQDPAQ NVESSHCMTM ILPDGD....  
 .....DLHI  
 HMGRclustalW{chineseham} AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..

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FIG. 3200

.....EDLYI  
 HMGRclustalW{chineseha2} AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..  
 .....EDLYI  
 HMGRclustalW{syrianhamst} AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..  
 .....EDLYI  
 HMGRclustalW{ rat} LHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..  
 .....EDLYI  
 HMGRclustalW{ rabbit} AHAANYVTAI YIACGQDAAQ NVGSSNCITL MEASGPPN..  
 .....EDLYI  
 HMGRclustalW{ human} AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..  
 .....EDLYI  
 HMGRclustalW{ mouse} AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..  
 .....EDLYI  
 HMGRclustalW{ xenopus} AHAANIVTAI YIACGQDAAQ NVGSSNCITI MEATGPTY..  
 .....EDLYI  
 HMGRclustalW{sea urchin} AHAANIVTAI YIATGQDAAQ NIASSNCMTL METRGPKG..  
 .....GDLYL  
 HMGRclustalW{ cockroach} AHAANIVTAI FIATGQDPAQ NVGSSNCMTL MEPWGEDG..  
 .....KDLYV  
 HMGRclustalW{drosophila} AHAANMVTAV FLATGQDPAQ NVTSSNCSTA MECWAENS..  
 .....EDLYM  
 HMGRclustalW{dictyostel} AHASNIVTAI FLATGQDCAQ NVESSNCITQ MEACNDG...  
 .....QDLYI  
 HMGRclustalW{schistosom} AHAANIIAGM FAATGQDLAQ VVDSSSCLTQ LEVDLSD...  
 .....DSLVA  
 HMGRclustalW{archaeoglo} ..... .IATGNDFRA IEAGAHSYAA IGG.YKPLTT  
 YEVDKGNLV  
 HMGRclustalW{pseudomonas} ..... .VATGNDWRA VEAGAHAYAC RSGHYGSLTT  
 WEKDNNGHLV  
  
 Consensus AHAANIVTAI FIATGQDPAQ NVESSNCITM MEAVNDGN-- -----  
 KDLHI

## FIG. 32PP

1050	1001
HMGRclustalW{methanobac}	AVNLPDVPLA TVGGGTGLET ASECLDIMGV RGGG.....
RVHAFAEIVG	
HMGRclustalW{methanococ}	SVTLPDVPIG TVGGGTRVET QKECLEMLGC YGDN.....
KALKFAEIVG	
HMGRclustalW{halobacter}	SVSIASLEVG TVGGGTKLPT QSEGLDILGV SGGGDP.AGS
NADALAECIA	
HMGRclustalW{sulfolobus}	SVTLPSLEVG TVGGGTRLPT QKEALSIMGV YGSGNP.PGS
NAKKLAEIIA	
HMGRclustalW{ yeast2}	SVSMPSIEVG TIGGGTVLEP QGAMLDLLGV RGPHTPEPGA
NARQLARIIA	
HMGRclustalW{ yeast1}	SVSMPSIEVG TIGGGTVLEP QGAMLDLLGV RGPHTAPGT
NARQLARIVA	
HMGRclustalW{phycomycs}	.....
.....	
HMGRclustalW{ fusarium}	SVSMPSIEVG TLGGGTILEP QGAMLDILGV RGSHTNPBGD
NARRLARIIG	
HMGRclustalW{ candida}	SVSMPSIEVG TIGGGTILDP QGSMLELLGV RG.PADVPEGE
NARQLAKIVA	
HMGRclustalW{dictyoste2}	SVTMPSIEVG TVGGGTHLPA QSACLDLLKI RGANLERPGA
NSEQLARVVA	
HMGRclustalW{wheat1}	SVTMPPIEV. ....
.....	
HMGRclustalW{ rice}	SVTMPSIEVG TIGGGTCLAS QAACLNLLGV KGSNHGSPGA
NAGRLATIVA	
HMGRclustalW{ corn}	SVTMPSIEVG TVGGGTQLAS QSACLDLLGV RGASRDRPGS
NARLLATVVA	
HMGRclustalW{wheat3}	SVTMPPIEV. ....
.....	
HMGRclustalW{wheat2}	SVTMPPIEV. ....
.....	
HMGRclustalW{ soybean}	SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKESPGS
NSRLLATIVA	
HMGRclustalW{rubbertre3}	SVSMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKDSPGS
NSRLLATIVA	
HMGRclustalW{rosyperiwi}	SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKDSPGA
NSRLLATIVA	
HMGRclustalW{ tomato}	SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGANREAPGS
NARLLATVVA	
HMGRclustalW{woodtobacc}	SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGANREVPGS
NARLLATIVA	
HMGRclustalW{ potato}	SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGANRDAPGS
NARLLATIVA	
HMGRclustalW{radish}	SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKESPGM
NSRRLATIVA	
HMGRclustalW{arabadopsis1}	SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASTESPGM
NARLLATIVA	
HMGRclustalW{cucumismel}	SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKESPGA
NSRLLATIVA	
HMGRclustalW{rubbertre2}	SVTLPSIEVG TVGGGTQLAS QSACLNLLGV MGACKESPGS
YSRLLATIVA	
HMGRclustalW{rubbertre1}	SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGANKESPGS
NSRLLAIVA	
HMGRclustalW{camptothec}	SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKEAPGS
NARLLATIVA	
HMGRclustalW{arabadops2}	SVSMPCIEVG TVGGGTQLAS QAACLNLLGV KGSNNEKPGS
NAQQLARIVA	
HMGRclustalW{chineseham}	SCTMPSIEIG TVGGGTNLLP QQACLQMLGV QGACKDNPGE
NARQLARIVC	

HMGRclustalW{chineseha2}	SCTMPSIEIG	TVGGGTNLLP	QQACLQMLGV	QGACKDNPGE
NARQLARIVC				
HMGRclustalW{syrianhamst}	SCTMPSIEIG	TVGGGTNLLP	QQACLQMLGV	QGACKDNPGE
NARQLARIVC				
HMGRclustalW{rat}	SCTMPSIEIG	TVGGGTNLLP	QQACLQMLGV	QGACKDNPGE
NARQLARIVC				
HMGRclustalW{rabbit}	SCTMPSIEIG	TVGGGTNLLP	QQACLQMLGV	QGACKDSPGE
NARQLARIVC				
HMGRclustalW{human}	SCTMPSIEIG	TVGGGTNLLP	QQACLQMLGV	QGACKDNPGE
NARQLARIVC				
HMGRclustalW{mouse}	SCTMPSIEIG	TVGGGTNLLP	QQACLQMLGV	QGACKDNPGE
NARQLARIVC				
HMGRclustalW{xenopus}	SCTMPSIEIG	TVGGGTNLAP	QQACLQMLGV	QGASTETPGK
NACQLAQIVC				
HMGRclustalW{sea urchin}	SCTMPSIELG	TVGGGTVLPP	QSACLQMDV	KGSNIHGSGL
NASQLARIVC				
HMGRclustalW{cockroach}	SCTMPSIEIG	TIGGGTVLPP	QAACLDMLGV	RGANEMCPGE
NANTLARIVC				
HMGRclustalW{drosophila}	TCTMPSLEVG	TVGGGTGLPG	QSACLEMLGV	RGAHATRPGE
NAKKLAQIVC				
HMGRclustalW{dictyostel}	TVTMSPIEVG	TVGGGTSLPA	QSACLDIIGV	KGSSSSSKPGA
NADQLAKTIA				
HMGRclustalW{schistosom}	SVTMPCLEVG	TVGGGTRLSG	QRACLDLLDL	SV.....D.R
PTEHLSRIIA				
HMGRclustalW{archaeoglo}	GTIEIPMAVG	VIGGATKVN	LAKISLKILG	VNTAEELARV
HMGRclustalW{pseudomonas}	GTLEMPMPVG	LVGGATKTHP	LAQLSLRILG	VKTAQALAEI
				AVAV
Consensus	SVTMPSIEVG	TVGGGTQLAP	QSACLNLLGV	KGA-KESPGS
NARQLARIVA				

NADH binding domain 2

## FIG. 32RR

1051

1100  
 HMGRclustalW{methanobac} GAVLAGELSL MGALAAGHLA RAHSELGRG. ....  
 .....  
 HMGRclustalW{methanococ} AAVLAGELSL LGALAAGHLG KAHQELGR.. ....  
 .....  
 HMGRclustalW{halobacter} VGSLAGELSL LSALASRHLS SAHAELGR.. ....  
 .....  
 HMGRclustalW{sulfolobus} STVLSGELNL LAALSNKELG KAHAKLGRAM KV.....  
 .....  
 HMGRclustalW{ yeast2} CAVLAGELSL CSALAAGHLV QSHMTHNRK. ..TNKANELP  
 QPS.....  
 HMGRclustalW{ yeast1} CAVLAGELSL CAALAAGHLV QSHMTHNRKP AEPTKPNNLD  
 ATDI.....  
 HMGRclustalW{phycomyces} .....  
 .....  
 HMGRclustalW{ fusarium} AAVLAGELSL CSALAAGHLV RAHQHNRSA APSRSTTPGS  
 SHDARLTGHD  
 HMGRclustalW{ candida} SIVLSGELSL VSALAAGHLV QSHMQHNRAA AKK.....  
 .....  
 HMGRclustalW{dictyoste2} AAVLSGELSL MSALAAGHLV RSHLKHNKRKT EAPAPQADTI  
 SMTHNLPHSD  
 HMGRclustalW{wheat1} .....  
 .....  
 HMGRclustalW{ rice} GSVVAGRALL LAALASGHLV KSHMMYNRSS KDVAK.....  
 .....  
 HMGRclustalW{ corn} GGVLAGELSL LSALAAGQLV KSHMKYNRSS KDVSS.....  
 .....  
 HMGRclustalW{wheat3} .....  
 .....  
 HMGRclustalW{wheat2} .....  
 .....  
 HMGRclustalW{ soybean} GSVLAGELSL MSAIAAGQLV NSHMKYNRSS KDVTK.....  
 .....  
 HMGRclustalW{rubbertre3} GSVLAGELSL MSAIAAGQLV NSHMKYNRSA KDVSK.....  
 .....  
 HMGRclustalW{rosyperiwi} GSVLAGELSL MSAISAGQLV RSHMKYNRSS KDITN.....  
 .....  
 HMGRclustalW{ tomato} GSVLAGELSL MSAISSGQLV NSHMKYNRST KDVTK.....  
 .....  
 HMGRclustalW{woodtobacc} GSVLAGELSL MSAISAGQLV KSHMKYNRST KDVTK.....  
 .....  
 HMGRclustalW{ potato} GSVLAGELSL MSAISAGQLV KSHMKYNRSI KDISK.....  
 .....  
 HMGRclustalW{radish} GAVLAGELSL MSAIAAGQLV RSHMKYNRSS RDISG.....  
 .....  
 HMGRclustalW{arabadopsis1} GAVLAGELSL MSAIAAGQLV RSHMKYNRSS RDISG.....  
 .....  
 HMGRclustalW{cucumismel} GSVLAGELSL MSAIAAGQLV RSHMKYNRSS RDVSK.....  
 .....  
 HMGRclustalW{rubbertre2} GSVLAGELSL MSAIAAGQLV KSHMKYNRSS KDVSK.....  
 .....  
 HMGRclustalW{rubbertrel} GSVLAGELSL MSAIAAGQLV KSHMKYNRSS KDMSK.....  
 .....  
 HMGRclustalW{camptothec} GSVLAGELSL MSAIAAGQLV NSHMKYNRSN KDVTK.....  
 .....  
 HMGRclustalW{arabadops2} GSVLAGELSL MSAIAAGQLV KSHMKYNRSS RDIGP.....  
 .....  
 HMGRclustalW{chineseham} GTVMAGELSL MAALAAGHLV RSHMVHNRSK INLQD.....

FIG. 32SS

```

.....
HMGRclustalW{chineseha2} GTVMAGELSL MAALAAGHLV RSEMVHNRSK INLQD.....
.....
HMGRclustalW{syrianhamst} GTVMAGELSL MAALAAGHLV RSEMVHNRSK INLQD.....
.....
HMGRclustalW{      rat} GTVMAGELSL MAALAAGHLV RSEMVHNRSK INLQD.....
.....
HMGRclustalW{      rabbit} GTVMAGELSL MAALAAGHLV KSEMIHNRSK INLQD.....
.....
HMGRclustalW{      human} GTVMAGELSL MAALAAGHLV KSEMIHNRSK INLQD.....
.....
HMGRclustalW{      mouse} GTVMAGELSL MAALAAGHLV RSEMVHNRSK INLQD.....
.....
HMGRclustalW{      xenopus} STVMAGELSL MAALAAGHLV KSEMVHNRSK INLQD.....
.....
HMGRclustalW{sea urchin} ATVMAGELSL MSALAAGHLV KSEMKHNRSA LNIASPLPSI
DEVATHRRSK
HMGRclustalW{cockroach} GTVLAGELSL MSALAAGHLV KSEMRHNRSS VSTSG.....
.....
HMGRclustalW{drosophila} ATVMAGELSL MAALVNSDLV KSEMRHNRSS IAVNSAN...
.....
HMGRclustalW{dictyostel} SAVMAGELSL MSALSAGHLM KSHLQYNRAK TN.....
.....
HMGRclustalW{schistosom} GTVLAAELSL MAALDTDDLK KAHMHFNRAK QSTNSHSCSH
STTTDNNNDNI
HMGRclustalW{archaeoglo} ..GLAQNFPA LRALATEGIQ RGHMELHARN LAIMAGATGD
EVDRVVEIMV
HMGRclustalW{pseudomonas} ..GLAQNLGA MRALATEGIQ RGHMALHARN IAVVAGARGD
EVDWVARQLV

Consensus GTVLAGELSL MSALAAGHLV KSEMK-NRSS KDVSK-----

```

\* †††

## FIG. 32TT

	1101	
1152		
HMGRclustalW{methanobac}	.....	.....
.....		
HMGRclustalW{methanococ}	.....	.....
.....		
HMGRclustalW{halobacter}	.....	.....
.....		
HMGRclustalW{sulfolobus}	.....	.....
.....		
HMGRclustalW{ yeast2}	.....	..NKGPPCKT SALL.....
.....		
HMGRclustalW{ yeast1}	.....	..NRLKDGSV TCIKS.....
.....		
HMGRclustalW{phycomyces}	.....	.....
.....		
HMGRclustalW{ fusarium}	QCPRALSVNN	VDERRRYSEV KAIDE.....
.....		
HMGRclustalW{ candida}	.....	.....
.....		
HMGRclustalW{dictyoste2}	.....	.....
.....		
HMGRclustalW{wheat1}	.....	.....
.....		
HMGRclustalW{ rice}	.....A	.....AS.....
.....		
HMGRclustalW{ corn}	.....T	.....TATEK TRQREVDV..
.....		
HMGRclustalW{wheat3}	.....	.....
.....		
HMGRclustalW{wheat2}	.....	.....
.....		
HMGRclustalW{ soybean}	.....I	.....S.....
.....		
HMGRclustalW{rubbertre3}	.....I	.....TF.....
.....		
HMGRclustalW{rosyperiwi}	.....I	.....ASSQL ESDS.....
.....		
HMGRclustalW{ tomato}	.....A	.....SS.....
.....		
HMGRclustalW{woodtobacc}	.....A	.....SS.....
.....		
HMGRclustalW{ potato}	.....	.....
.....		
HMGRclustalW{radish}	.....A	.....TTTT.
.....		
HMGRclustalW{arabadosis1}	.....A	.....TTTTT TTT.....
.....		
HMGRclustalW{cucumismel}	.....L	.....ES.....
.....		
HMGRclustalW{rubbertre2}	.....A	.....AS.....
.....		
HMGRclustalW{rubbertrel}	.....A	.....AS.....
.....		
HMGRclustalW{camptothec}	.....A	.....SS.....
.....		
HMGRclustalW{arabados2}	.....S	.....SQVNR
.....		
HMGRclustalW{chineseham}	.....	...LQGTCTK KSA.....
.....		

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## FIG. 32UU

HMGRclustalW{chineseha2} .....LQGTCTK KSA.....  
 .....  
 HMGRclustalW{syrianhamst} .....LQGTCTK KAA.....  
 .....  
 HMGRclustalW{ rat} .....LQGTCTK KAA.....  
 .....  
 HMGRclustalW{ rabbit} .....LEGACTK KAA.....  
 .....  
 HMGRclustalW{ human} .....LQGACTK KTA.....  
 .....  
 HMGRclustalW{ mouse} .....LQGTCTK KAA.....  
 .....  
 HMGRclustalW{ xenopus} .....LPGTCTK KAA.....  
 .....  
 HMGRclustalW{sea urchin} SVDFSALKES SAAAPGTCTA NAS.....  
 .....  
 HMGRclustalW{ cockroach} .....S ...EPSTPAC KS.....  
 .....  
 HMGRclustalW{drosophila} .....NP LNVTVSSCST IS.....  
 .....  
 HMGRclustalW{dictyostel} .....  
 .....  
 HMGRclustalW{schistosom} SNIYDNHVA LSSKIPVTDN SDIRESVHSL HVK2FPVKSD  
 LSVNPEISHY TM  
 HMGRclustalW{archaeoglo} RDGKIRLDYA KEVLRLRS. ....  
 .....  
 HMGRclustalW{pseudomonas} EYHDVRADRA VALLKQKRGQ .....  
 .....  
 Consensus -----A ---LQGTCTK KAA-----  
 ----